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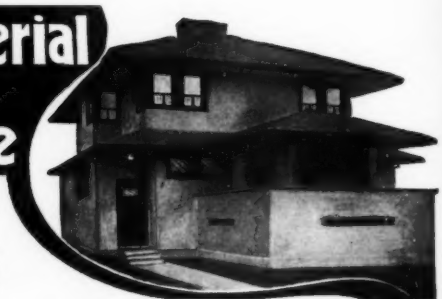

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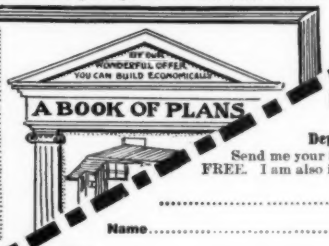

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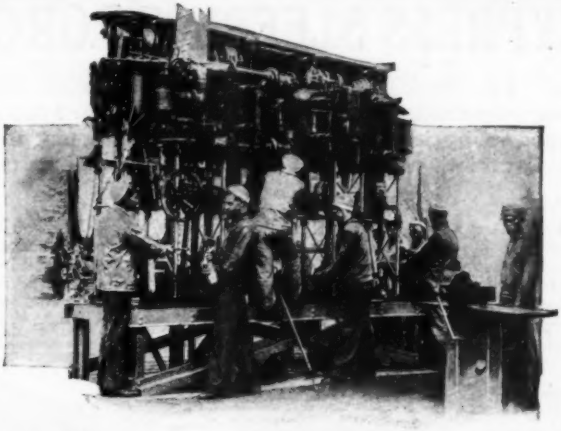

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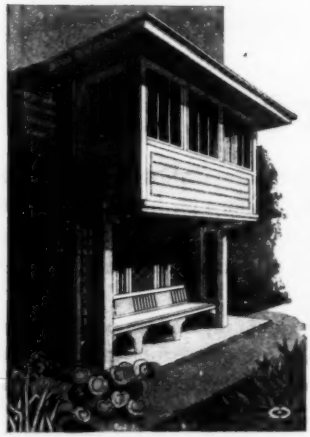

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Popular Mechanics Magazine

318 W. Washington Street, Chicago, U. S. A.

EDITED BY H. H. WINDSOR

ISSUED MONTHLY — SUBSCRIPTION: — SINGLE COPY, 15 CENTS

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Notice to Employers:—Concerns desirous of engaging competent advertisement-writers at a salary of $35 to $100 per week are requested to communicate with us. This service is gratis.

But Who Knows It!!

That's the vital question with you today.

Who knows beyond the little circle of friends what your true worth is?

Of course, all the "Boys" in the office know it and I dare say the boss knows it too.

But that isn't enough.

You must increase your horizon until it attracts the attention of other business men.

Then your service will bring you The Money.

There is but one way to accomplish this result. LEARN TO WRITE ADVERTISEMENTS.

Get into a position where your good efforts count for something more than they do in the job you are now holding.

The Advertising Man's good work for his concern is never locked in a vault over night, as is the good work of the firm's Accountant.

The Advertising Man's brains are not fagged out with the deluge of detail as is the case with the good Office Manager.

The Advertising Man's nerves are not on the point of snapping, as is the case with the good Credit Man, the good Estimating Man and the good Superintendent or other Employes of the business grind.

The Advertising Man's home is not merely a stopping place between stations for a few hours of happiness with his family, as is the condition with the good Traveling Man.

The Advertising Man's freedom from the harrowing conditions that surround the average man is due to the fact that his work is fascinating. It arouses the interest and attracts the attention of competitors and thus keeps his good services continually before them and at a premium.

Such a pleasant situation is indeed inspiring and leads a man to success.

Is there any reason then why you should not be a Page-Davis Man?

The Advertising Man knows his success depends upon himself; that his reputation is being spread broadcast before all business firms, where it will do him the most good every time his handiwork appears in the daily papers.

He does not depend upon the good graces of any one employer for a letter of recommendation when he seeks a change of position, because he has already established a reputation for himself.

That is why Page-Davis Men are successful.

That is why you should get out of the "rut" into the freedom of the most fascinating and profitable profession in the world, where you can double your present salary or income.

The Advertising Man holds the first rank in the estimation of men in business and social life—he is attributed with being above the average. He is always credited with being a money maker.

Such a condition inspires ambition, and it all helps you to success.

If there is the least spark of "go" in you, you will be a Page-Davis Man—a complete success.

The "original school" combines all that was good in earlier advertising with all that is best in modern advertising. It has set the pace for advertisers all over the world. You learn at the fountain-head how to originate clever advertising.

We will send you free, full details regarding the opportunities for you to immediately get into the profession and the latest list of employed graduates earning up to $100 a week, as a result of this very training we now offer you by correspondence.

Just enter your name on the coupon and address your letter.

Cut out and send this coupon

Page-Davis School—Send me without cost, your beautiful prospectus and all other information.

Name.....

Address.....

City.....

State.....

PAGE-DAVIS SCHOOL

Address | 112 Page Building - CHICAGO
Either Office | 112-150 Nassau St. - NEW YORK

LEARN JEWELERS ENGRAVING This high salaried and easily learned trade taught thoroughly by mail. We teach beginners better engraving than can be gained in years of rigid apprenticeship. We also improve the skill of any engraver. *Ask for catalog, Free.* **Engraving School, 112 Page Bldg., Chicago, Ill.**

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BE AN ILLUSTRATOR. Learn to draw. We will teach you by mail how to draw for magazines and newspapers. Send for Catalog. School of Illustration 112 Page Bldg. Chicago, Ill.

1913 ENLARGED and REVISED COURSE — JUST OUT. Price advances soon.

WOULD YOU GIVE $12 to LEARN the AUTO TRADE

AS CHAUFFEUR OR MECHANICIAN?

Then READ Carefully

Before taking your course I was working in a factory at another trade. I am **now repairing autos,** as per your Employment Plan, and have **more work than I can attend to.** I made $10 for 8 hours' work yesterday. Thanking you for helping me with your course and employment plan, I am, Yours truly, JOHN L. BORK, 973 Liberty St., Toledo, O.

Have just overhauled a car with great success. People told me a person could not learn by mail, and I will admit that it did have me guessing when I first read your ad, but I am now convinced. **The Working Models and the Charts, etc., make it easier to learn by your system than any other way.**—E. A. TUCKER, Charlotte, Mich.

If we PROVE to you that we have started hundreds of others into the repair business and as chauffeurs—who had no previous experience and who knew no more about an auto than you do right now—**will you enroll?**—of course you would. Now the next thing for you to do is to write me just as quick as possible and **LET ME PROVE IT.**

H. M. Fewins and S. T. Slayback, both graduates, are now running a Garage and Repair Shop at Woodbine, Iowa.

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Harry J. Herbin, Jamestown, Kans., was farming, but has now doubled his income repairing and selling autos.

Milford McClelland, Astoria, Ill., became professional chauffeur and more than doubled his salary. (Now in Denver, Colo.)

A. L. Foust, formerly of Washingtonville, Pa., was in another line of work. He took our course and is now at the head of the leading garage of Milton, Pa.

And we could continue until we had filled this and several more pages.

Our book of testimonials, showing photos of students and their shops—free.

Open a Repair Shop of Your Own

BE AN AUTO MECHANICIAN

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THIS IS IN ADDITION to our usual rates for such contributed articles.

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Checks will be sent on the last day of each month for the prize articles received during that month. Publication in the magazine will follow in about two months.

PRIZES AWARDED FOR MARCH, 1913

First Prize—R. E. RHINES, Centralia, Wash..... $10
"To Keep a Large Flag Close to the Pole"

Second Prize—W. H. WHITMER, Portland, Oregon..... $5
"Destroying Moles"

EXTRA AWARD

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MAULEY K. HASKINS, Syracuse, N. Y..... $5
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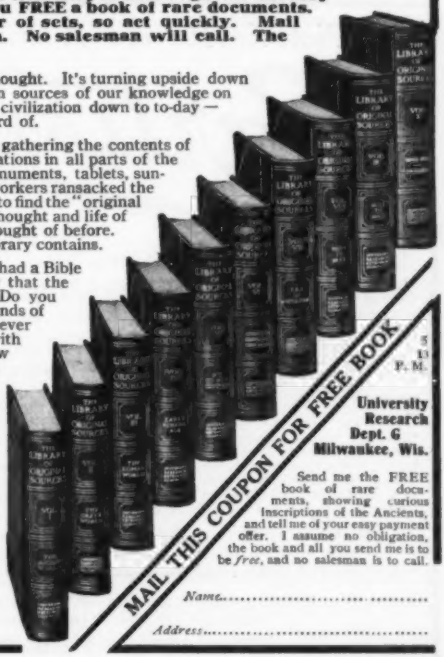

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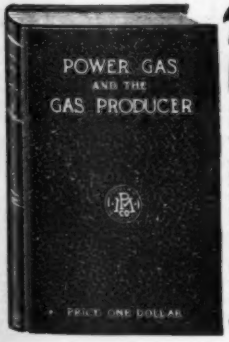

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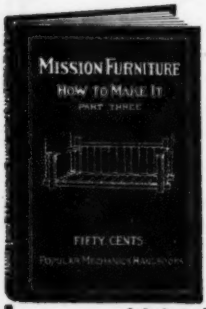

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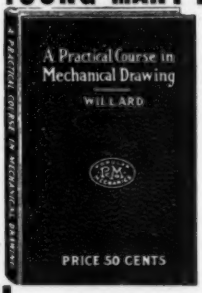

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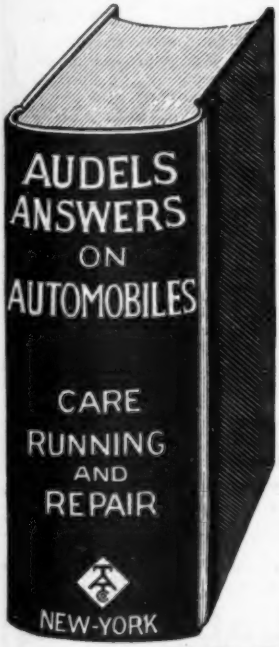

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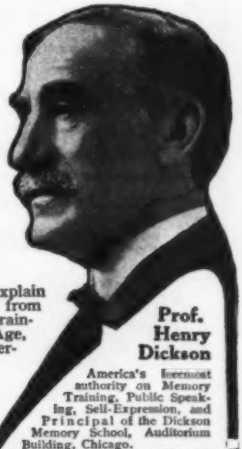

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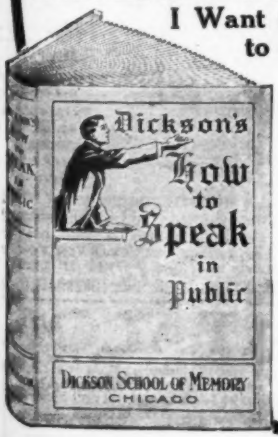

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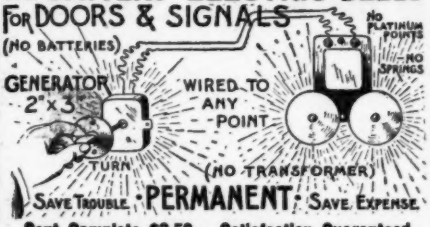

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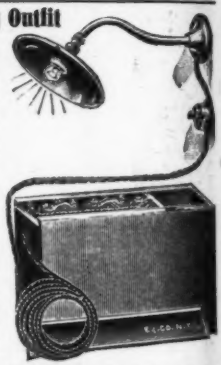

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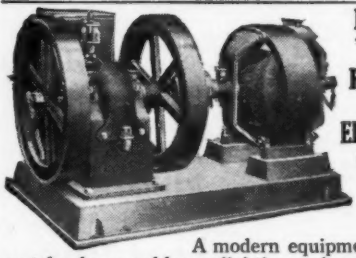

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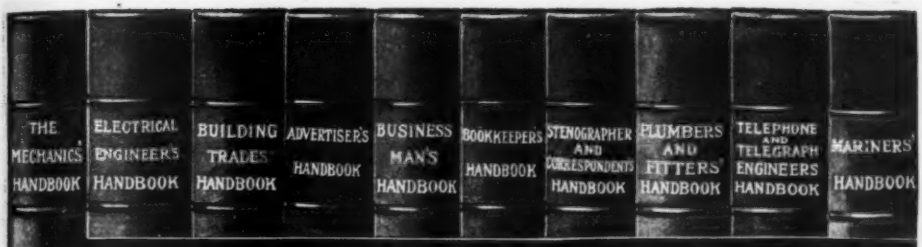

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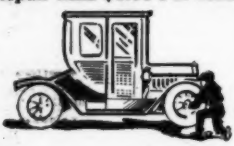

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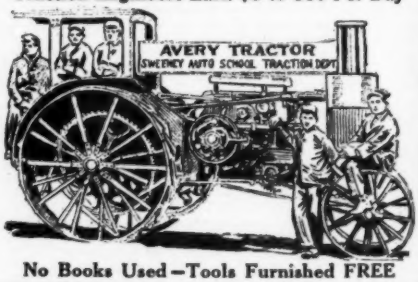

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MOTION Picture Work—A large 618-page book covering every phase of the moving picture, its production and its theatre. Indispensable for reference and instruction to the thousands of workers in the motion picture field. Price $4, postpaid. Popular Mechanics Book Dept., 318 W. Washington St., Chicago.

LEARN to write photoplays and make big money. Producers pay from $25 to $100. Easy to learn. Great demand. Ours the only school whose instructor is a successful photoplaywright. Catalog free. Authors' Motion Picture School, Box 139K, Chicago, Ill.

EASY Payments—Moving Picture Machines, standard size. Others, $5 to $40, and all moving picture apparatus. Catalogues. Ralph J. Golsen, Department M., 65 East 46th St. Chicago.

WRITE and Sell Motion Picture Plays. Book tells how. Used as text by school. 25c. Play Brokerage, Fostoria, O.

MAKE $50 to $100 weekly writing Photoplays. Experience unnecessary. We explain how. Particulars free. Writers' Syndicate, 860A Monadnock Block, Chicago.

MOTION picture plays wanted. You can write them. We teach you by mail. No experience needed. Big demand and good pay. Details free. Ass'd M. P. Schools, 601 Sheridan Rd., Chicago.

FOR ADVERTISERS

5,000 PAPER Drinking Cups, printed, $1.80 per M. Yarroll, New Britain, Conn.

YOUR 30 word ad in our 24-page postcard magazine 15c. Display 50c inch. Elite Exchange, 3827 N. 44th Court, Chicago.

BARGAIN Advertising Rate—Just to get acquainted. 15 words, one insertion; guaranteed 13,000 copies printed, and one year's subscription, 25c. Digest, Grand Rapids, Mich.

DUPLICATORS AND DEVICES

ROTARY Neostyle, good order $10.00. Office Appliance Co., Boston, Mass.

THE Modern Duplicator, made without glue or gelatine, is the World's Standard. Fifty to seventy-five exact duplicate copies can be made from each one you write or draw with pen, pencil or typewriter. $2.40 to $6.00 according to size. Booklet Free. Durbeen, Reeves & Co., Mfgrs., 339 Fifth Ave., Pittsburg, Pa.

HOW to get a Hektograph that will make 150 copies in 10 minutes; letter size, $2. Write for circular. Heyer Duplicator Co., 113 No. La Salle St., Chicago.

CEMENT

IF you want the best information on cement and concrete construction, subscribe for Concrete-Cement Age, leading cement and concrete monthly. Sample copy, 10 cents. Yearly subscription, $1.50. Concrete-Cement Age, 135 Newberry Bldg., Detroit, Mich.

BUSINESS OPPORTUNITIES

MAKE More Money! Operate a good, substantial Mail Order business—our "Silent Salesman" system can easily be done in spare time yet the possibilities are unlimited! For years "Booster" has actually and accurately led thousands like you over the Successful Road to Wealth. To succeed you've got to read The Booster Magazine for "Booster" is Opportunity and starts you in business for yourself—tells you how to get the dollars—puts you next to the best money making propositions on earth—ones that really get You the money. Send 10c for two months' trial subscription. Booster Magazine, Northwestern Building, Chicago.

INSTRUCTION In Mail Order Business of the right kind. Agents opportunities; Work in spare time. Formulas; Manufacturer, Dealer and Agent brought together each month in our magazine. Only 10c per copy, three months 25c. $1 per year with premium. The "Lever" Mail Trader, 44, Elizabeth, N. J.

WE Start You In Business, furnishing everything: men and women, $30.00 to $200.00 weekly operating our "New System Specialty Candy and Popcorn Crispette Factories" home anywhere, no canvassing. Opportunity lifetime; booklet free. W. Ragsdale Co., East Orange, N. J.

SELL By Mail—New patented specialties; factory prices: new selling plans; small capital. Spare time; Copyrighted Prospectus free; Mississippi Valley Co., Inc., Box M-629, Pittsburg, Kas.

"THE Art and Process of Dry Cleaning." A fascinating and profitable occupation. 25 cents postpaid. Auburn Supply Co., Dept. DC, 7745 Peoria St., Chicago.

HOME Manufacturing—Pleasant and profitable business quickly established during spare time. Product international necessity. Write for particulars. Delzell Mfg. Company. Desk A, 448 South Mathews, Los Angeles, Cal.

BUSINESS Representative, 22 to 30 years old, wanted in every town over 1000. Whole or part time. Opportunity to come to New York. Institute of Business Engineers, 2213 Singer Building, New York City.

RESILVER mirrors and make plenty of money. Full instructions, 25 cents. Auburn Supply Co., Dept. RM, 7745 Peoria St., Chicago.

$3000 IN your back yard starting with few boxes. No ginseng or mushroom dope. Send for Back Lots Scheme Circular. Metz, P. O. Box M 87, Times Sq. Station, N. Y.

EARN $7 to $12 daily, restoring faded colors in rugs and carpets, whole or spare time. Original Armenian Process. Great demand. No capital. Full particulars free. Eldred, Dept. 75, Detroit, Mich.

USE your spare time to build up a mail order business of your own. We help you start for a share in profits. 27 opportunities. Particulars free. Mutual Opportunities Exchange, Buffalo, N. Y.

ROADMAN'S and Agents Guide, New edition just out, 100 plans and schemes 25c. Particulars free. Harry Zimmerman, 1016 Oakdale, Chicago.

FORM a corporation—Congress Law for D. C. and all states: cheap. Raise money easily. U. S. Legal Corporation, Washington, D. C., Representing $1,225,000,000.

I HAVE Had ten years' experience and have made good in the Mail Order Business; began with $5. Send for free booklet; tells how. Heacock, 5074 Lockport, N. Y.

READ "An Amateur's Experience in Mail Order Business." Exposes pitfalls. Free. Arthur Whipple, West Saginaw, Mich.

AN intelligent person may earn $100 monthly corresponding for newspapers. No canvassing. Send for particulars. Press Syndicate, 760, Lockport, N. Y.

START a Silver Plating Business in your own home—$25 a week easily made. Complete instructions $2. C. E. Clarke, Box 137, Leavenworth, Kans.

STOP: Investigate at once: New business: No experience: 500% profit making photos with the new One Minute Post Card Camera. Takes and delivers finished post card photos in one minute right on the spot. No plates, films or dark room. Make big money everywhere, traveling or at home. This is your opportunity for immediate and permanent success. Don't delay! Write today for free information. The One Minute Camera Co., Dept. 30, Rand-McNally Bldg., Chicago.

OPERATE Hahn's Premium Machines, the best seller for cigars and candies. J. Hahn, 1016 Germantown Ave., Philadelphia, Pa.

WAGE Earners. Every Wage Earner, Foreman, Superintendent, or others, will be given an opportunity to get "A Farm of 10 to 160 Acres, or its equivalent in the world's largest orchards, practically Free." Providing you care to accept our advertising proposition, help us to interest your friends and settle up this famous Ozark country. "The land of the Big Red Apple," along the Missouri Southern Railway—54 miles completed—we want the people. Act quickly—limited number only. Missouri Southern Immigration Co., 1412 Great Northern Bldg., Chicago, Ill.

FROM $2000.00 to $3000.00 per year is made by many of our customers on operating portable gasoline engine driven vacuum house-cleaning outfits. We make vacuum cleaners of all sizes and types. State how and where machine is to be used, giving full particulars. Richmond Radiator Company, 1480 Broadway, New York.

FOR 10c to cover advertising, etc., I'll send scheme (mail-order or local) that brought me $2 in one hour, with bank reference and testimonials. One man has made $100 monthly with it—write him. If satisfactory, remit $1 from profits; if not, return. Fink, 3 YMCA, Kane Penn.

YOUR 25-word ad placed in 28 good monthly magazines for $1.25. One inch display, $3. Write me before placing any advertising. I'll save you money. F. L. Miller, 1000 Bastable Block, Syracuse, N. Y.

PARTY with $5,000 can become half-owner and make a fortune. Louis L. Crane's Box Kite Dirigible Airship, patented, will cross ocean in 100 hours. Absolutely safe. Call or write. Crane 259 9th St., Brooklyn, N. Y.

WHY not start a growing business? Make Concrete Fence Posts. Big demand. Big profit. We tell you how. Myland, 2125 N. Front, Philadelphia, Penn.

BICYCLE business For Sale, Chicago. Fine trade, large stock, 20 years established. Cheap for cash. W. M., 6th floor, 318 W. Washington St., Chicago.

WE help raise capital at once to start you in retail, manufacturing, patent, real estate, mail-order, or any legitimate business, by means of "our practical method." Particulars free. The Business Aid Co., K 504, Detroit, Michigan.

WOULD you like to own a good-paying mail order business? We have a line that gets repeat orders all the time. You can start in spare time; invest a dollar or two a week and soon own a nice business of your own; write for particulars. Nadico, 1664 Belmont Ave., Chicago.

LEARN Metalizing! That fascinating art which transforms flowers, insects, etc., into beautiful jewelry. Pleasant and profitable. Stamp brings sample. P. Benson, Stewartville, Minn.

$1.00 RESILVERING Mirror Formula, and year's subscription to our 24-page postcard magazine 40c. Elite Exchange, Dept. C4, 3827 N. 44th Ct., Chicago.

GOOD Money for ladies or gentlemen in every county. Send stamp for samples. Fairplay Supply Company, 10 Main, Fort Pierre, South Dakota.

START a formula business—Make $50.00 weekly, 50 cents silver brings complete instructions and 25 best formulas. C. Parker, Box 28, Columbia, Tenn.

ENCLYCOPEDIA of Business Chances. Money making methods exposed; how small ventures lead to wealth; 2000 trade secrets, etc. Descriptive booklet free. Reimel & Co., 96 Broadway, N. Y.

SEND for my booklet, "how you can become your own master" without capital, and my big free offer. E. Daugherty, 1236 Madison St., Chicago, Ill.

AD Bargains—20 words in 100 monthlies $1; 100 weeklies $2; 20 big Sunday papers $5. Life Co., St. Louis.

THERE'S money in Iowa for you. Address L. E. Bowers, 219 S. Dearborn St., Chicago, for special Iowa advertising proposition.

PATENTABLE ideas wanted—Send for 3 free books. Richard B. Owen, 30 Owen Bldg., Washington, D. C.

EGYPTIAN Cleanall. The best grease and oil extractor; large profits; everybody needs it. Complete plans and formula 10c. The Anjo Company, Box 497, Galesburg, Ill.

LEARN Electroplating—Practical results may be obtained by following the directions in our book on electroplating. This is a working guide for the beginner written by an old hand at the business. 112 pages, 62 illustrations, cloth, 50 cents postpaid. Popular Mechanics Book Dept., 318 W. Washington St., Chicago.

LET the Parcels Post Help You. Add ($15 to $25 weekly) to your present salary or income. Start during spare time and build up a permanent mail-order business of your own. We show you how and help you make good. No canvassing. Experience unnecessary. The Parcels Post makes success doubly sure. Our new ideas and up-to-date plans bring the money. No so-called "Course of Instruction" to sell. We give that free. Write today. Address Pease Mfg. Co., Inc., Dept A, 70 Broadway, Buffalo, N. Y.

ASK Bode! Advice about "anything" 25c. Particulars free! Write now! J. Bode, 561p Main, Hartford, Conn.

$40 WEEKLY, manufacturing Post Cards. Easy to learn. Stamp gets particulars. Grandon, Jackson, Mich.

MAKE and Sell Mission Furniture—From our instructions one man who was an amateur made and sold $400 worth of just one article alone. We give you 98 designs and easily followed directions for making each piece in 3 books at 50 cents each or $1.50 per set, postpaid. Popular Mechanics Book Dept., 318 W. Washington St., Chicago.

WE Sell Patents. Established 1900. If you wish to add a new product to your line, write us. Charles A. Scott Co., 1096 Granite Bldg., Rochester, N. Y.

MAIL Order Business. I start you free. P. Newnham, Waukegan, Ill.

INCORPORATE your business under Arizona laws. Cost small. No franchise tax. Stockholders exempt from corporate debts. Do business anywhere. Laws and forms free. Southwestern Securities & Investment Company, Box D488, Phoenix, Arizona.

TRIAL Offer: $1 places your 25 word ad in 200 different magazines. Send copy now. King's Magazine, Box 13P, Little Silver, N. J.

WE start you in a permanent business with us and furnish everything. We have new, easy selling plans and seasonable leaders in the Mail Order line to keep factories busy. No canvassing. Small capital. Large profits. Spare time only required; personal assistance. Write today for (copyrighted) plans, positive proof and sworn statements. J. M. Pease Mfg. Company, 541 Pease Bldg., Main Street, Buffalo, N. Y.

BIG Money in the Mail Order Business. Experience unnecessary. Small capital. Instructions free. Keith, 719 Central Bldg., Rochester, N. Y.

MAIL Order Dealers! Advertisers! You need our 1913 Advertising Rate Book with the latest Dollar-making feature "Ads That Pay." Hot from the press! Gives you cost of Advertising in 2000 recognized magazines and newspapers, location, circulation, closing dates and other useful knowledge. Includes thirty original Mail Order propositions, winners every one of them. A $10,000 investment at your service. You can make a legitimate profit of 95c on every dollar order. This very valuable manual sent prepaid to you for 10c. Write now! Dearborn Advertising Agency, 521 Dearborn St. Chicago.

INDEPENDENCE and fortune quickly attained in the Manufacturing Mail Order business. I furnish Formulas, Manufacturing Processes and Trade Secrets in all lines. Sold under positive guarantee; 18 years' practical experience. Revision and improvement of Formulas and Processes—reduction of manufacturing cost—utilization of waste materials, etc., a specialty. Booklet, Formula List, and Valuable Information Free. W. L. Cummings, Ph. D., 127 Standard St., Syracuse, N. Y.

BIG Profits for You! Manufacture Barley Crisp. New confection. 5c package costs you 1c. Machine, instructions complete $7.50 prepaid. Send 10c for samples. Barley Crisp Co., 1605 Hyde St., San Francisco.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything and guarantee success. Send for proofs. Voorhies. Desk C. R., Omaha, Neb.

I WILL start you earning $4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operations. G. F. Redmond, Dept. 306, Boston, Mass.

COLLECT money by a sure, simple, system. Income $1,000 to $5,000 a year. Quick results. No capital required. Instructive book. "Skillful Collecting," free. National Collectors Ass'n., Long Street, Newark, Ohio.

EXCLUSIVE County Rights for Wonder Cloth now being allotted; everybody buys; big profits; repeat orders come fast; opportunity to start a local, a mail sales and jobbing business; new selling method; small capital; particulars and sample free. Bethlehem Utilities Co., 65 G, Pine St., New York.

LOCAL Manager in Each City not yet Allotted to Sell "Cisco,"—a big money saver,—to automobile owners, supply houses and garages. Large profits. Must be able to handle salesmen and have $50 to $250 cash. No proposition like this ever before offered. Address E. C. Routzabn, 127 Duane St., Suite 92, New York.

AGENTS WANTED

AGENTS Wanted—Here's big money for you—and a stylish nobby suit absolutely free. $40 a week easy. Many are making more. Nothing to learn. Nothing to buy. Nothing to invest. No capital required. We furnish everything free—even the suit of stylish clothes you wear. Our men are the swell dressers and it don't cost them a cent, and they make big money every week. Get in now. Now is the time for the big money. Your name on a postal brings everything free. The handsomest lot of samples of the latest suitings you ever looked at to choose your suit from. And a book of fashion plates showing the very latest, nifty, nobby styles; also measuring blanks and everything needed—all free. We pay expressage on everything. Send that postal now—don't wait. This is your chance—grasp it. American Woolen Mills Co., Dept. 514, Chicago.

WANTED—Resident agents to introduce the new Short Out to Light. No engines, dynamos or intricate machinery; new inventions revolutionize old methods; costs much less to install and operate than any known method of illumination; gasoline lights that can be switched on and off instantly; artistic fixtures for all purposes, such as the lighting of stores, homes, churches, halls, streets, etc.; nothing to wear out or get out of order; a 10-year guarantee furnished with each system; an opportunity of a lifetime is offered industrious men to get into a permanent money-making business; every system installed sells others; every user an enthusiastic booster. Write at once. Gloria Light Company, 1271 Washington Blvd., Chicago.

YOUNG man, would you accept and wear a fine tailor-made suit just for showing it to your friends Or a Slip-on Raincoat Free? Could you use $5 a day for a little spare time? Perhaps we can offer you a steady job. If you live in a town smaller than 10,000, write at once and get beautiful samples, styles and this wonderful offer. Banner Tailoring Company, Dept. 274, Chicago.

AGENTS—$60.00 weekly. We make the finest needle case on the market. 200 to 400 per cent profit. New proposition. Approval plan envelopes makes talking unnecessary. Henderson at Springfield, Mo., made $83.00 last week. Send 10c for 25c sample containing 115 needles, all particulars free. Buy direct from the importers at wholesale. Write us today. National Importing Co., 226 Granite Bldg., St. Louis, Mo.

AGENTS—$10 per day sure selling our New 1913 Styles Silk Neckwear. 3 fifty cent ties $1. Monogram Gold Cuff Link and Stick Pin Set given Free. Cooper made 75 sales in 7½ hours. Profit $30. Free samples to hustlers. Dayton Neckwear Mfg. Co., Dept. I, Dayton, Ohio.

AGENTS making $3—$12 daily. No competition. New rapid sellers. Every home and office your field. No capital required. Write for particulars and strong testimonials. Wm. F. Butler, Dept. J, Milwaukee, Wis.

SALESMEN:—Working for us means cash in your pocket every day: Household Device; duplicate orders; profits big, experience unnecessary. Write immediately. Specialties Supply Co., No. 31 Willoughby Street, Brooklyn, N. Y.

SALESMEN Wanted: Our goods are sold around the world. They are required in every home in all civilized countries. We are establishing selling agencies for the large Cities, also for each County throughout the U. S. and want good men for these positions. Business will be permanent and should afford an income of $3,000 to $6,000 a year. Small working capital and a good record required. Address Manager, 221 Franklin St., Buffalo, N. Y.

AGENTS, drop dead ones. Awake! Grab this new invention. Low priced water-power home massage machine. Magical, marvelous, mysterious. New field. Big profits. Sold on moneyback guarantee. "Margwarth sold 5 in 10 minutes; 31 in 2 days." "Parker sells 8 first day." Vaughn, "Your machine has merit. Express 6 dozen." Free information. Blackstone Co., 701 Meredith, Toledo, Ohio.

SHOW the "Sweep Cleaner" to any housewife and she will find the money to buy it. Retails for $7.50. It's two years ahead of any other hand vacuum cleaner and is backed by the makers' reputation of 13 years as manufacturers of carpet sweepers. Write for agents' terms to National Sweeper Co., 20 Laurel St., Torrington, Conn.

DON'T waste time selling something everybody sells! Specialize! Golden Dew Drop Perfumes are fast sellers, quick repeaters. $5 easily made within few hours. Sample and particulars for dime. Tanner, 181 Lexington Ave., New York.

SIGN Agents. Painters 500% profit with our splendid line guaranteed flexible gold sign letters and trade emblems. Write today for free catalogue and samples. Eastern Specialty Co., Dept. 5, 63 Barclay St., New York.

AGENTS—New invention. Electric Cigar Lighter. Used on cigar cases. Quick seller to Hotels, Drugstores, Restaurants, Poolhalls, Cafes. Big profits. Special offer. Drake Mfg. Co., 142 Reed St., Milwaukee, Wis.

AGENTS—Earn $25 to $40 per week selling Nodarn Guaranteed Hosiery. Summer samples now ready. Big commission. Repeat orders. Write today for particulars. Nodarn Hosiery Mills, Desk I, Dayton, Ohio.

WONDERFUL Amazing Invention! Just out. Agents coining money. Lights home or office brilliantly for one cent per night. We loan you sample. Allen-Sparks Gas Light Co., Lansing, Mich.

AGENTS—Our absolutely square $30 to $67.50 weekly salary and 30% commission proposition assures steady workers unlimited prosperity. Galloway-Bowman Company, Div. 371, Waterloo, Iowa.

AGENTS—Salary or commission. Greatest seller yet. Every user pen and ink buys on sight. 200 to 500 per cent profit. One agent's sales $620 in six days; another $32 in two hours. Monroe Mfg. Co., X 6, LaCrosse, Wis.

AGENTS—You can make $40 to $75 a week selling Guaranteed Aluminum Ware to consumers. Complete sales course free. Your territory open. Answer quick. Dept. F. American Aluminum Co., Lemont, Ill.

AGENTS make 500% profit selling our gold window letters, novelty signs and changeable signs. 800 varieties in enormous demand. Catalogue free. Sullivan Co., 1238 Van Buren St., Chicago, Ill.

AGENTS—100% profit—sell to saloons—machine a whirlwind seller. Free sample and salesmanship course. Two sales a day $15 profit. Write. Simplex Mfg. Co., Dept. 7, Kewanee, Ill.

AGENTS—Men or women, wanted to introduce high grade specialties in every home; quick sales; big profits; write for particulars. J. Weinert & Co., 3405 Pierce Ave., Chicago, Ill.

AGENTS self-filling fountain pen, has 14Kt gold pen guaranteed. Send $1 for sample and prices. H. D. D. Sutton, West Haven, Conn.

LIVE wire salesmen wanted on salary or commission to introduce a sure winner; big pay; particulars free; answer quickly. M. F. Metz, Decatur, Ill.

MAKE and sell your own goods. Formulas by Expert Chemists. We obtain your Government Serial Number. Catalogue for stamp. B. Mystic Company, Washington, District of Columbia.

AGENTS: Sell the "Majestic" 3 Bellows Vacuum Carpet Cleaner. Sweeper Type. Big Seller. Enormous profits. Exclusive territory. Home Vacuum Cleaner Co., 1922 Wabash Ave., Chicago.

GREAT fortune selling wonderful patented attachable fan for sewing machines, exclusive territory, sample only $1. Attachable Fan Co., Portland, Oregon.

WHEN you sell Feeny Vacuum Cleaners you deliver the goods. New principle—creates wonderful suction. One general agent's total commissions 1912 was $18,498. Write today for our attractive proposition. Feeny Mfg. Co., B-28 Muncie, Indiana.

NEW low offer. Three wonderful sellers. Washing, Ironing, Bluing. Housewives use weekly. Samples 10c. Full packages, 25c. Particulars Free. Leibman, 720 A, Lefferts, Richmond Hill, N. Y.

AGENTS wanted quick. Clean legitimate money-making proposition. No space for explanations. Write for full particulars and exclusive territory. Krueger Mfg. Co., Dept. 2A, 167 W. Washington, Chicago.

AGENTS—$5 daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 462 Third St., Dayton, O.

AGENTS—Something new. Cheapest and best cherry seeder. Easy seller. Big profits. Sample and particulars 10c. C. S. Hendrick, 222 S. Madison, Clinton, Ill.

AGENTS wanted for a new household labor saver. Quick seller. Big profits. Cary-Dane Co., 102 West 101st St., N. Y.

CANVASSERS—Send for sample, quick selling Nickel Safety Razor. Postpaid 22c. Sells 50c. Bohart & Co., Clinton, Iowa.

AGENTS—250% profit. Wonderful little article. Sells like wildfire. Can be carried in pocket. Write at once for free sample. H. Mathews, 1962 Third St., Dayton, O.

YOU can make money everywhere selling our oil properties; situated in Liberty County, near Humble, Texas, in the heart of the Gulf Coast Oil Belt; prices low; terms easy, lots sell rapidly; full descriptive matter furnished free to Agents. Good proposition for quick sales; Agents now making $50 to $75 weekly in commissions. Previous experience not necessary. Live Agents wanted in every community. Write today for full particulars. Address, C. A. Bryan & Co., Owners, 260 First National Bank Bldg., Houston, Texas.

SIGN Agents—Painters—Something new and better. Attracto ready-made Gold and Silver letters. 21 kinds, easily applied. Make big money lettering store windows, making signs, and selling our line of flashing, sparkling chipped glass name-plates. No experience needed. Write for sample letter and catalogue and start at once. Address Attracto Sign Co., 2655 North Clark Street, Chicago.

AGENTS—Something new—fastest sellers and quickest repeater on earth. Permanent profitable business. Good for $50, a week. Safety Razor with soap; Gas and Range Lighter; Life Saving Gas Burner. Sample 25c each. Write for particulars. Manufacturer Berthold, Flushing, L. I.

MAIL Order Dealers should have our proposition. Imprint circulars furnished. Post Supply Company, Waltham, Mass.

SALESMEN wanted for the help-a-phone. Almost every telephone user buys one to three; sells for $3; $108 a week clear; instructions in salesmanship free. Regina T. 16 Efland, North Carolina.

SOAP Agents. Our Vegetable Soap, Toilet Articles and Remedies Excel and Outsell. Sample Free. Buchanan & Co., 54 N. Main St., St. Louis, Mo.

$60 WEEK Selling New 3½ pound hand power Vacuum cleaner. Retails $6. Get agency. Manufacturer, 723 Colonial Bldg., Boston.

AGENTS. $10 daily selling "Perfect" Double Suction Hand Vacuum Cleaners. Territory guaranteed. Perfect Cleaner Co., 384 Hudson St., New York.

AGENTS. Monogram safety razor in beautiful box with any lodge emblem and monogram engraved, sample sixty cents. Hampson, Box 56, Station O., New York.

AGENTS wanted everywhere to sell high grade household specialties; quick sales; write today. United Specialty Agency, Dept. 19, Elko, S. C.

$6 TO $12 daily demonstrating Peerless Lawn Edge Trimmer. One free. Trimble & Avery, Dept. 3, Belding Mich.

WANTED agents calling on Toy Dealers, to take as a side line, an absolutely new Aerial toy. Auto & Marine Specialty Co., Trenton, N. J.

AGENTS. Our 100 per cent profit goods are steady money makers. Three weeks' trial salary guaranteed. Standard Silverware Co., Boston, Mass.

SEND 40c for the Yankee Fire-Kindler, the great fuel saver. Nowell H. Stanton, Dept. M. Poynette, Wis.

BIG money in Essex Fan Motors, run by gas or gasoline. Winfield H. Smith, 10 Lock Street, Buffalo, N. Y.

MEN'S shirts to measure. $1.25 and up. Outfit free. Peerless Shirt Makers, Dept. 18, Chicago.

AGENTS Wanted—We want a live man in every town to act as a sales manager. We want you in your town. Devote your spare time to our business and you will make bigger money than you ever made before. Give us all your time and we will make you rich. These are facts, not promises. $50 a week at the start. Besides, a nobby free suit—and all the clothes you want at less than wholesale price. Wear one of our free suits as an advertisement and people will flock to you to buy a suit like it and you will coin money. Get our money making proposition and beautiful book of samples. Just send a postal card. We pay express charges on everything. Join the live wires—send us a postal today. Paragon Tailoring Co., Dept. 514, Chicago.

CURIOUS Books, money-making secrets; send stamp. "Sentenn" E-737 Ursuline, New Orleans, La.

WE want articles to manufacture. Schultz Patent Office, Cincinnati, Ohio.

EDDIE FOY recommends "Colby" Hosiery;" Koenig writes, "Orders yesterday, $43.25;" develop permanent, profitable business; free book tells how. Colby Hosiery Company, 2103-11 Second St., Philadelphia, Pennsylvania.

AGENTS. Our great Luminous picture, Rock of Ages. Wonderful, mysterious; cross shines brilliantly in darkest room. Sample 25c prepaid. Exclusive territory. Big profits. Pioneer Portrait Co., 1249 W. 63rd St., Chicago.

PORTRAIT agents find our plan beats all others. Prompt shipments—rejects credited. 30 days' Credit. Catalogue of Portraits, Frames, Pillow Tops, sheet Pictures and samples free. James C. Bailey & Co., Desk E-6, Chicago.

START a Manufacturing business at home in spare time. Formulas for manufacturing Six Big Sellers and description of 50 other opportunities sent postpaid for 10c. Answer now. C. H. Anderson, Box 111, Chestertown, Md.

AGENTS—Here's an opportunity to earn $30 weekly and upward. A new line—exclusive territory. Send postal today for full particulars. A. S. Shuh, Sales Mgr., 1760 Sycamore St., Cincinnati, O.

AGENTS—Make 150% Profit! New idea in Door-plates. Sell for 25c. Made in a minute and easily adjusted. Write for proposition. Cellumina Co., Attleboro, Mass.

AGENTS and salesmen will secure free, complete information of numerous money making selling propositions and newest specialties in hands responsible concerns. Address Distributor, 26 Cedar St., N. Y.

AGENTS. A pair of silk hose Free to active Agents. State size. Agents wanted every town for complete and beautiful hosiery line. Large profits. Write today. Triplewear Hosiery Mills, Dept. D, 112 So. 13th St., Philadelphia, Pa.

AGENTS—To sell our new Tire Pump to auto owners. Engine does the pumping, sells for $5. Exclusive territory. National Novelty Co., Joliet, Ill.

AGENTS make $10-$20 daily selling our metallic letters; handsome, durable, universal use; anybody can put on; write for particulars, samples. N. Y. Sign Letter Co., Arbuckle Bldg., Brooklyn, N. Y.

AGENTS—Men and women, newest invention. Wing Self Heating Gasoline Flat Iron; guaranteed, sells everywhere. Women delighted. Write for particulars. Wing Mfg. Co., 1608 Fulton St., Chicago.

FRUIT Jar Filler. Household necessity. Insures perfect preserves. Sells on sight. Agents make $5.00 and upward daily. Absolute guarantee. Sample and instructions 15c. Shearman Mercantile Co., Indianapolis, Ind.

1500% PROFIT selling our Gold Sign Letters. We'll show you how. Sample free. Johnston Co., Quincy, Ill.

AGENTS secure territory for the Ideal Lawn Mower Sharpener. Most practical sharpener made. Write Weyburn Sales, Rockford, Ill.

DEALERS, Agents. Just invented, wonderful dime novelty. Appeals strongly to everyone. Columbia Co., 1557 Wells St., Chicago.

AGENTS—Something New. Quick Seller. Hustler can make $25 to $50 weekly. Sample 18c. Consolidated System Co., Wichita, Kans.

WRITE with Your Finger. New Invention. Big Seller. Sample 10c. Dozen 75c. K. Fancy Specialty Co., 303 Ashland Blvd., Chicago.

SOLICITORS Both Sexes $2.50 a day salary or commission, selling liquid known alcohol flavorings and toilet articles. Manufacturers' Distributing Agency, St. Louis, Mo.

AGENTS wild with excitement. Everybody buys our beautiful two color show cards. Catalogue free. Popular Show Card Co., Dept. MA, 1235 Michigan Ave., Chicago.

READ the Agents Magazine. Make more money. 2 months, 10c. Agents Magazine, Chicago.

DO you want to earn more money? "Tell it to Sweeney." Read page 18.

BY acting as agent for our books, you can use your spare time to good advantage. You do not have to be a "professional" to take this up, as these books are just what everyone wants. Write for particulars, Popular Mechanics Book Dept., 318 W. Washington St., Chicago.

YOU can make more money operating a mail business, but before taking any chances invest 10c for two samples of "Booster"—the one bona fide Mail Order and Agents' publication on earth—a magazine that has for years actually and accurately started others like you in business for themselves by publishing the best money making propositions on earth—ones that really get You the money! Send 10c today—it's worth dollars to you. Booster Magazine, Northwestern Building, Chicago.

AGENTS—A device that Saves Money, Increases Efficiency, adds to Comfort, Convenience; Beautifies the home, office and store—and is Electrical, is the kind of device to sell. Show these features on an article, to the people to-day, and your sale is made. I have that article. If you are alive, wide awake and want to handle a General Agency for the most unique electrical specialty, which will cut lighting bills in Half, write for my proposition. Stanley B. Freiberg, 190 Station F, Cincinnati, O.

AGENTS—"Border Wars of Texas," a book of 400 pages of thrilling accounts of Indian raids, battles, etc.; 40 full page illustrations portraying the cruel hardships of the Texas pioneer. It is a quick seller for agents. Sent postpaid for $1.50 cloth, $2.00 morocco, or terms, etc., for stamp. Matt Bradley, Tioga, Texas.

WHERE did your money go? Find out. Begin any time with our Daily Expense Record. It will keep you posted and reduce expenses. A very interesting and complete book—50c. Agents wanted. Auburn Supply Co., Dept EX, 7745, Peoria St., Chicago.

HAVE you a few hours to spare? We want man or woman in each town. No capital needed. An hour's work shows dollars earned in spare time. Pocket sample. 400% profit. G. C. Mfg. Co., (Dept. 104). 20 Warren St., N. Y.

SALESMAN in every town over 1000 to represent several manufacturers of hundreds of the best patented articles and other products. Whole or part time. You sell to dealers and appoint agents. The Premo Manufacturing Company, 95 Liberty Street, New York City.

GOVERNMENT Positions Open to Men and Women. $90.00 month. Annual vacations. Short hours. No "lay offs." Parcels Post means thousands of postal appointments. "Pull" unnecessary. Farmers eligible. Write immediately for free list of positions open. Dept. Franklin Institute. Dep't N 22. Rochester, N. Y.

"INSPECTOR" is the best seller and most practical article at present. Shows immediately whether milk is pure or watered. Protects every family against fraud. Big profits. Retails 50c. Specialties Co., 672 Eagle Ave., N. Y.

HATPIN point protector and hatpin combined. Meets Hatpin Law. 30,000,000 women need several each. Beautiful designs; tremendous profits. Send 25c to $1 for samples. Particulars free. Selective Supply Company, Dept. P, Lynn, Mass.

SELL $10.00 hosiery noon hour, shops, factories; make over $100.00 per month. Koenig wires, "Sales yesterday $43.25." Free sample plan. Colby Hosiery Mills, Second and Diamond, Philadelphia, Pa.

$20-40 WEEKLY, selling guaranteed Hosiery, Underwear, Sweaters, Neckties, Handkerchiefs. Credit. Samples free. Sales Manager, Room 62, 54 Worth St., N. Y.

"GILANOR" Speedy Stitcher Awl. Best automatic awl for leather and heavy goods. Regular $1.00 Sample, post-paid for 70c and this advertisement. Agents wanted. Gilanor Company, Roswell, N. M.

AGENTS—To sell the newest electric appliance on the market; sold everywhere there is electricity, in the home and office; liberal profits; sales-driving sample, weighs a pound, no experience or knowledge of electricity required; it shows how to use one light instead of two and get the same results; sells for $3.50 and saves the purchaser an investment of $25; write for particulars. The Handy Light Co., 16 Handy Light Block, Cincinnati, O.

SELL by Mail. New patented specialties; factory prices; new selling plans; small capital. Spare time; copyrighted prospectus free; Mississippi Valley Co., Inc. Box N-629, Pittsburg, Kan.

I HAVE had ten years' experience and have made good in the Mail Order Business; began with $5. Send for free booklet. Tells how. Hescock, 147 Charles St., Lockport, N. Y.

AGENTS—Hurry—Something new. Sanitary device for telephones. Millions will be sold. 150% profit. Apply for territory. Hygienic Phondate Co., 1082 Jefferson, Toledo, O.

BRAND New Line; Solid Aluminum Handle Kitchen Knives. Guaranteed best quality steel. High class proposition. Particulars free. LeRoy Specialty Co., 76 Park Place, N. Y. Room 52.

YOU can make money as our general or local agent. Permanent business. Every woman wants a set; they buy on sight; big profits. Exclusive territory. Write today. Red Cross Supply Co., Dept. 1, St. Louis, Mo.

SELLING Agents Wanted for "Fire Out." Best selling small fire extinguisher. A real money maker for you. Our proposition won't disappoint you. The Inst. Lighter Co., Dept. M, Columbus, O.

AGENTS: or any man, a guaranteed Safety Razor that does the work of the $3.50 one for 50c, sent anywhere on receipt of price (P. O. Money Order). Arthur C. Morey, Bantam, Conn.

AGENTS that Canvass among Farmers; Make $300 Monthly. Write, United States Wheel Lubricator Company, Wittenberg, Wis.

AGENTS—$10 daily can be earned by everybody, undertaking an easy agency as an extra; expert knowledge unnecessary. Write A. Steenken, Amsterdam, Holland. (Postage, 5c.)

SELL Pals Changeable Scarf Pin, Handkerchiefs, Neckwear; send stamp for sample. Pals Manufacturing Co., 25 East 14th Street, N. Y. City.

AGENTS to take orders for Visiting and Business cards; large commission; outfit free. Forman Printery, Waterbury, Conn.

AGENTS. Don't accept any proposition until you read my free booklet. 360% profit; no competition; no canvassing. Electro-Appliance Corroboration, Box 261, Los Angeles, Cal.

$150 MONTH. No Canvassing or Mail Order Phantom. Absolutely new. Saves merchants $10. Box 4, Fort Scott, Kan.

BOUGHT on sight in every factory and town. $4 Raincoats. Write for Agency. Boston Raincoat Company, Box 2815 Boston, Mass.

$15 DAILY Selling $20 Soda Fountain. King, 1764 Aberdeen, Philadelphia.

AGENTS, $25 weekly; credit given. Smith, 1355B, Clinton Avenue, N. Y.

WRITE Me. Enormous profits. Lightning sellers. John Shear, Putnam, N. Y.

CHEWING Gum—Sell to dealers. Clean, profitable business built up quickly with our new brands. Four flavors, novel packages. Send 10c for full pack of each and exclusive territory proposition. Helmet Gum Factory, 39 Opera Place, Cincinnati, O.

AGENTS—A cent sent Swank tells about free offer and how to sell greatest discovery of the age in homes, stores, factories, offices. Easiest seller; out Nov. 29, 1912. Biggest profits. A. H. Swank Mfg. Co., Fremont, O., Dept. 19. Toronto, Canada Branch, 226 Shaw St.

AGENTS make big money selling our new gold letters for office windows, store fronts and glass signs. Any one can put them on. Write today for free sample and full particulars. Metallic Sign Letter Co., 406 N. Clark St., Chicago.

WE are the largest manufacturers of Twisted Wire Brushes in America. Highest grade goods, best service, highest profit. Write for our new catalog. You are sure to win. Fuller Brush Co., 33 Hoadley Place, Hartford, Conn.

$1,000 EARNED by three people within thirty days selling our Fire Extinguishers. Buyers everywhere, protected territory, 500% profit. Local and State Agents wanted. United Manufacturing Company, 1025 Jefferson, Toledo, Ohio.

AGENTS wanted for "Healo" the toilet preparation for preventing all forms of excessive perspiration. Big money. Start now. Particulars free. Health Medicine Co., Dixon, Ill.

U-KAN-PLATE—The polish that plates; $18-$40 week year round; exclusive field; free booklet. C. B. Seabury, L405, Boonton, N. J.

400% PROFIT selling our high grade work. Samples free. Gordon Co., Northwestern Bldg., Chicago.

AGENTS make $5.00 to $10.00 a day on the start. Atkinson writes: "The best proposition I have found in my forty years canvassing." Permanent work. Household necessity. Saving 80%. Write to-day for General or Local Agents terms. Free sample. C. H. Stuart & Co., 16 Union St., Newark, New York.

AGENTS—$200 monthly distributing Newells needle cases. Sell 115 needles in book for 10c and make 200% profit. Approval Plan envelopes make talking unnecessary. Crew Managers write. Send 10c for sample book and particulars. Newell Company, 509 N. Grand, St. Louis, Mo.

AGENTS—$60 weekly premiums easily made. Write for free particulars and samples today. 100% profit besides premiums. No money required. Lloyd Company, 242 De Balivere, St. Louis, Mo.

AGENTS—Make $10 per day selling wonderful lock-stitch-awl-hand-sewing-machine. 100% profit. Sells itself. Send 50c for $1 sample. W. A. MacKenzie, 268 De Balivere, St. Louis, Mo.

MONEY making business for high grade agents, selling our Sick-Call Outfit to Catholic Families. Write for details. Frank Schilling Co., Navarre, Ohio.

$2.50 PER day paid one man or woman in each town to distribute free circulars and take orders for concentrated flavoring in tubes. Permanent position. J. S. Ziegler Co., 443-D, Dearborn St., Chicago.

SIGN Agents—Stop paying fancy prices for Gold and Silver Metallic Sign Letters. Note ours: 2-inch letters, 70c; 3-inch, 89c; 4½-inch, 90c per 100. Non-tarnishable, staple goods. 5 assorted samples and instructions, 10c. Particulars free. H. Alexander, manufacturer, 328 East 59th St., New York. Established 1905.

AGENTS $10 to $15 per day easily made; 150% profit; exclusive territory; our cleaning, polishing and dustless mop is the big money getter and record breaker. Duncan Bros., 2910 N. Troy St., Chicago.

GOOD Mechanics to use and sell graduated Calipers, Whichway Levels. Paying proposition. Ernest Smith, Columbia, Pa.

500% PROFIT selling our wonderful sign letters for office windows, store fronts and glass signs; resembles finest gold leaf; easily applied; samples free. Metallic Letter Co., 406 N. Clark St., Chicago.

EARN $15 to $25 a week or more as our Mail Order Dealer. Right from your own home. Hold your position until entire time is required. We are manufacturers and owners of Patented just-in-season specialties. If you are just starting a Mail Order business or if already established, you can't afford not to handle our Patented Money making getters. We sell exclusively to our Mail Order Dealers. We protect them. We carry stock and furnish everything. No canvassing. Small capital. Experience unnecessary. Write today for latest patented leader and manufacturer's easy selling Mail Order (copyrighted) plan backed up by "Whole Truth," positive proof and sworn statement. J. M. Pease Mfg. Co., 539 Pease Bldg., Main St., Buffalo, N. Y.

SOAP agents make more money selling the celebrated Linro line. Coffee, flavorings, spices, soaps, perfumes, and 135 other items. Big commissions to you. Exclusive territory. Freight allowed. Handsome premiums to your customers. Free sample case. No deposit required. Free catalog. Linro Company, 13 Linro Bldg., St. Louis, Mo.

AGENTS sell rich looking imported 36x68 rugs $1 each. Carter, Tenn., sold 115 in four days, his profit $57. You can do as well. Write for sample offer and selling plan. Sample rug by Parcel Post prepaid 98c. A. Condon, Importer, Stonington, Maine.

MEDALLIONS—300% profit. Make up your own goods and be independent. Catalogue free. Resag Co., 1205 Randolph St., Chicago.

AGENTS—Would you take a steady job where you can clear $20 to $30 weekly and work up to yearly profits of $3,000 or more. My line is snappy household goods. Quick sellers. Get busy with postal asking particulars. E. M. Davis, B17 Davis Blk., Chicago.

WANTED immediately agents to sell our high grade rebuilt typewriters, also ribbons and carbons; over 100% profit. Send for large illustrated catalogue and special agents offer. Harlem Typewriter Exchange, Agency Dept. 215 West 125th St., New York City.

KEY Checks—$1.45 per 100. Dies for stamping names on checks, fobs, umbrella pieces. Wholesale prices—Collar clips, sewing awls, etc. We show you how to make $5 per day. Pease Die Works, Dept. M., Winchester, N. H.

SELLING our exclusive linen heel and toe guaranteed hosiery direct from mill to wearer. Pays big profits. Customers waiting. Re-orders insure permanent, increasing income. Exclusive territory. Credit. N. Parker Mills, 720 Chestnut St., Phila., Pa.

AGENTS—County and State; men and women everywhere to sell the Pinless Clothes Line; a practical labor saving invention, lasts life-time, sells on sight, gives perfect satisfaction. Agent Sutton of Georgia, sold over million feet; 100% profit; write quick for exclusive territory; information free; sample prepaid 25c stamps. Pinless Clothes Line Company, 520 Wilcox Bldg., Portland, Oregon.

AGENTS. One cent invested in a postal card will bring you a $35.00 to $60.00 a week proposition. Sterling Aluminum Co., Canal Station, Chicago, Ill.

AGENTS make $30.00 weekly selling our 500 Handy Household Articles; catalogue free. Scheff Company, Desplaines, Ill.

AGENTS—$50 weekly; we manufacture the best needle case made, a wonderful seller; 200 to 500 per cent profit; talking unnecessary; our copyrighted "Trust Scheme" Envelopes do the work; general agents can make over $100 weekly; send 10c for a 25c sample containing 115 needles; particulars free; buy direct from the factory at wholesale. Paty Needle Co., 102 Union Sq., Somerville, Mass.

SAMPLE Free—Boyer's Automatic Re-Finisher for Furniture, Store, Bank and office Fixtures—Finest thing in the World. One application lasts a year. Applied with cheese cloth. Boyer Chemical Laboratory Co., State and Michigan Sts., Chicago.

WE manufacture glass paper; plain glass windows made to look like real stained glass; something new; easily applied; big money maker; 2 sample sheets, catalogue in colors, with discount for 10c. Parrish Co., Lakeside Bldg., Chicago.

WE furnish you capital to run profitable business of your own. Become our local representative and sell high grade custom made shirts, also guaranteed sweaters, underwear, hosiery and neckties, direct to homes. Write, Steadfast Mills, Dept. 10, Cohoes, N. Y.

AGENTS Wanted—Mechanics and shopmen make over $100 a month in spare time selling transparent handled novelty knives and razors. Big profits. Sales easily made. Write for terms today. Novelty Cutlery Co., 67 Bar St., Canton, O.

YOU can make $$$$ as our general or local agent. Household necessity; saves 80 per cent; permanent business; exclusive territory; salary or commission; free sample; credit. J. Pitkin, 113 Redd St., Newark, N. Y.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything and guarantee success. Send for proofs. Voorhies, Desk C. R., Omaha, Neb.

AGENTS—Handkerchiefs, dress goods. Carleton made $8 one afternoon; Mrs. Bosworth, $25 in two days. Free samples. Credit. Stamp brings particulars. Freeport Mfg. Company, 59 Main St., Brooklyn, N. Y.

DON'T fail to read Independence and Fortune under Business Opportunities.

AGENTS—Portraits 35c. Frames 15c. Sheet Pictures 1c. Stereoscopes 25c. Views 1c. 30 days' credit. Samples and catalog free. Consolidated Portrait Co., Dept. 1196, 1027 W. Adams St., Chicago.

I WILL start you earning $4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. G. F. Redmond, Dept. 306, Boston, Mass.

PERFECTION Pocket Adding Machine. Lightning seller. Agents wanted. Cincinnati Specialty Mfg. Co., Dept. R, Cincinnati, Ohio.

AGENTS wanted for Oriental novelties, never before seen in America. Quick sellers. Repeaters. Immense profits. Shaw Kanematz, Box 529, Portland, Oregon.

HELP WANTED

SALESMEN Wanted—We want men—salesmen (preferably those with road experience, although this is not absolutely essential). The increased demand for our product has exceeded our expectations and we are in position to use a number of real live salesmen. The field for our product covers almost every line of industry—store, factory, garage, railroad, etc. It is favorably known everywhere, having been widely advertised and successfully sold since 1885.

While we prefer men who have made a success in sales work, we have found that clerks and men of other lines have made remarkable records for themselves. No technical knowledge required.

This is your opportunity to secure a good territory, backed by the heartiest co-operation of a House of Honor, and practically start in business for yourself, fully equipped. The financial results are commensurate with the effort put forth. At any rate, write for our book, giving details, and then decide. Address, S. F. Bowser & Co., Inc., Fort Wayne, Ind.

FREE Illustrated Book tells of about 300,000 protected positions in U. S. service. Thousands of vacancies every year. There is a big chance here for you, sure and generous pay, lifetime employment. Just ask for booklet S-29. No obligation. Earl Hopkins, Washington, D. C.

AGENTS make big money and become sales managers for our goods. Fast office sellers. Fine profits. Particulars and samples free. One Dip Pen Company, Dept. 2, Baltimore, Md.

BIG Profits—Open a dyeing and cleaning establishment, little capital needed. We teach by mail. Write for booklet. Ben-Vonde System, Dept. C, Charlotte, N. C.

SALESMEN, both sexes, for best lands and lots in Houston District. Easy terms; liberal commissions; responsible company. C. W. Hahl Company, Houston, Tex.

SALESMEN everywhere to sell awnings; we teach you the business. Good money. A. W. Jones & Co. No. 602 West 131st St., New York, N. Y.

GET on the stage. Earn from $40 to $100 a week in vaudeville. Write to Herb Monahan, Vaudeville Author, Brockton, Mass.

WRITE moving picture plots. Good pay. We will show you how. Ripless Co., Brockton, Mass.

GOOD Letterers in demand. Send stamp for free book, "Successful Lettering." Columbia School of Drafting, McLachlen Bldg., Washington.

SALESMEN—Two for each state; oils, paints. Signet Oil Company, Cleveland, Ohio.

WANTED—Distributors of advertising matter everywhere. American Distributor, Blairsville, Pennsylvania.

CANVASS your home town for me. Enclose stamp for particulars. M. E. French, Clyde, O.

SALESMEN—Sell grocers "The Best Ever." Lady Washington Hulled Beans. Seattle, Wash.

GOVERNMENT Positions Open to Men and Women. $90.00 month. Annual vacations. Short hours. No "lay offs." Parcels Post means thousands of postal appointments. "Pull" unnecessary. Farmers eligible. Write immediately for free list of positions open. Franklin Institute, Dep't N 21, Rochester, N. Y.

DON'T Pay Anything to Learn a Trade. Investigate our system of teaching on actual contract jobs. Plumbing, bricklaying, electricity, automobiles; 200 workmen; six years' experience. Catalog free. United Trade School Contracting Co., Los Angeles.

MEN and Women Wanted for Government positions. $90.00 month. Parcels Post means thousands of appointments. Write for list of positions open. Franklin Institute, Dep't N 21, Rochester, N. Y.

LOCOMOTIVE Firemen, Brakemen, wages about $100, experience unnecessary. Send age, stamp. Railway Association, Dep't 89, 227 Monroe St., Brooklyn, N. Y.

PARCELS Post means thousands Government jobs open. Write for free list. Franklin Institute, Dep't N 21, Rochester, N. Y.

WANTED: Hydraulic operators and maintenance men for large power plant in the East. Permanent position with good prospects of advancement for the right men. Plant in small town located directly on the railroad, one hour railroad distance to larger city. Applications with full particulars to be addressed to P. C., 6th floor, 318 W. Washington St., Chicago.

PLEASANT Home Work—Ambitious persons can earn good income in spare time copying letters. Former experience unnecessary. Send today addressed, stamped envelope for particulars. Box 17, Station H, G., New York.

WANTED: Electrical operators and maintenance men for large power plant in the East. Permanent position with good prospects of advancement for the right men. Plant in small town located directly on the railroad, one hour railroad distance to larger city. Applications with full particulars to be sent to P. W., 6th floor, 318 W. Washington St., Chicago.

WANTED—Distributors, men or women, to give away free packages our famous Perfumed Borax Soap Powder; no money or experience needed; good pay. Ward & Co., 209 Institute Place, Chicago.

SALESMEN: Complete Line Lubricating Oils, Auto Oils, Greases, Paints, Varnishes and Specialties. Experience not necessary. Salary or Commission. Central Petroleum Co., Cleveland, O.

DO you want to earn more money? "Tell it to Sweeney." Read page 18.

WRITE Motion Picture Plays. Easy—Big Pay—We'll teach you. Address United Picture Play Ass'n, San Francisco.

WANTED—In every town reliable man to distribute circulars, samples, papers; tack signs, etc. Good pay; no canvassing. Enclose stamp. Charles L. Sims, Rosebank, N. Y.

RAILWAY Mail Clerks wanted. $90.00 month. May examinations everywhere. Sample questions free. Franklin Institute, Dep't N 21, Rochester, N. Y.

$$$$ INFORMATION Reporters Wanted everywhere. Spare time. Big pay. Confidential. Enclose stamp. National Information Sales Company, AXB, Cincinnati.

ANY intelligent person may earn steady income corresponding for newspapers. Experience unnecessary. Address Press Correspondence Bureau, Washington, D. C.

PARCELS POST Jobs open. Write for list. Franklin Institute, Dep't N 21, Rochester, N. Y.

WRITE For Newspapers. My book tells what's news, how to get it, where to sell. Newspaper directory included, 50 cents. No correspondence school. Morris White, Station 50, Detroit.

MEN and Women wanted for Government jobs. Write for free list of positions open. Franklin Institute, Dep't N 21, Rochester, N. Y.

FORMULA and instructions for silvering mirrors, 50 cents. Leroy Jipson, Rockland, Me.

WANTED Salesmen—Earn $250 per month, sell advertised goods. Best contract on earth. Elato Co., Station L, New York, N. Y.

WANTED—People to go on the road as traveling advertisers. P. Breeden, Box 558, Norfolk, Va.

MEN—Earn $100 to $150 monthly investigating; chance to see the world with all expenses paid; write, Loraine System, Dept. 304, Boston, Mass.

WANTED—Automatic Screw Machine Operators, Hand Screw Machine Operators, and Electrical Instrument Makers. Apply at the Employment Department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

BE a Detective. Earn $200 monthly, positions open. A practical course in Detective Work taught by mail. American School of Criminology, Detroit, Michigan. Dept. F.

EARN $10 to $15 a week, and hold your position besides. No canvassing. We, as manufacturers of patented just-in-season specialties, have new easy mail order plans to keep factories busy. We furnish everything. Large profits. Small capital. Experience unnecessary. If you are one of the want-to-go-ahead kind, write for our most modern (copyrighted) plans. Sworn Statement. J. M. Pease Mfg. Co., 540 Pease Bldg., Main St., Buffalo, N. Y.

WANTED, Machinists, Agents, double your salary! Saunders' Hand Book Practical Mechanics; lightning reference. Thousands used. $1.00, $1.25, $1.50. Circular sent. E. H. Saunders, 216 Purchase St., Boston, Mass.

MEN and boys to learn automobile repairing, driving on up-to-date cars; electricity, civil engineering, surveying. Methods most practical. Room and board while learning. Positions secured; satisfaction guaranteed; catalog free. National School of Engineering, 2110 W. 7th, Los Angeles.

GOVERNMENT Examinations. Most thorough preparation; $5; returned if not appointed; particulars free. American Civil Service School, Washington, D. C.

WANTED one thousand chauffeurs and repair men. Our demand for automobile engineers exceeds the supply. Calls for men of intelligence and mechanical bent capable of commanding $100 to $150 per month upon graduation. Resident course $20 to $60. Home Correspondence course completed by practical road and shop work at this school, highly successful. Look this up. Auto Schools of America. Dept. T, 1600 Michigan Ave., Chicago.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything and guarantee success. Send for proofs. Voorhies, Desk C. R., Omaha, Neb.

GO on the Stage. Vaudeville career offered you. Experience unnecessary. Managers endorse my method. Instructive vaudeville book free. Write today. Frederic LaDelle, Sta. 10, Jackson, Mich.

I WILL start you earning $4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operations. G. F. Redmond, Dept. 306, Boston, Mass.

DON'T fail to read Independence and Fortune under Business Opportunities.

MACHINERY, TOOLS AND SUPPLIES

ONE cracker oven for sale with complete machinery for operating same; also 125-HP Steam engine; some rope transmission equipment, shafting, hangers, pulleys, belting and electrical motors. Address, Perfection Biscuit Co., Ft. Wayne, Ind.

I HAVE several different sizes of the following machines for sale: Lathes, shapers, planers, drill presses, punch presses, fox turret lathes, screw machines, gas engines, steam engines and boilers, saw tables, band saws, swing saws. Pinner, 122 Water St., New York City.

FOR Sale—A1 second-hand steam boiler, 14 ft. long, 60-inch shell, 54 3½-inch flues, with full front and water column. W. H. Kirby, Quincy, Mich.

MOTOR—5 H. P. General Electric, nearly new A. C. 2-phase, $50. Woodward Machinery Co., 27 Blymer Bldg., Cincinnati, O.

MACHINISTS, send for free treatise "How to turn up or repair a crankshaft" with Warnock's combination lathe dogs. H. A. Warnock, Chicago, Ill.

WILL exchange $120 Federal Vacuum Cleaner. Fully equipped. Nearly new—Want Punch Press or Engine Lathe. Koren, 1621 Jackson Boul., Chicago.

SIXTY Horsepower Gasoline Motor, only used a few days, $250. C. Baldwin, 2300 University Ave., St. Paul, Minn.

FOR Sale Cheap, one 8 h. p. Vertical Stickney gas-engine, of heavy type, suitable for running small shop. Address R. K. Tyra, Minneapolis, Minn.

PULLEYS, Gears, Sprockets, Shafting, Hangers; see page 138. W. A. Jones Foundry & Machine Co., Chicago.

CAMPBELL Tool Sts any 1" wide rule. Something every carpenter should have. Postpaid on receipt of 25c. Montgomery & Co., 105 Fulton St., N. Y.

1000 NEW Lathe chucks, $10 to $20 each, all sizes. Lucas & Son, Bridgeport, Conn.

ENGINE Lathe, swings 9½", takes 25" between centers. Complete set gears cutting all size threads 3" to 40", $43.50. Grammes & Sons, Allentown, Pa.

SHAPERS—Hand or Power, will plane 4"x4"x1". Weight 75 pounds. Price with vise $55. Montgomery & Co., 105 Fulton St., N. Y.

FOR Sale, Lathes, Screw Cutting. S. B. Machine Tool Co., South Bend, Ind.

PULLEYS, Hangers, Gears, Sprockets. Small sizes for models. Montgomery & Co., 105 Fulton St., N. Y.

FOR Sale—Gasoline engines, automobiles, marine and stationary, also castings. Second-hand ones taken in exchange and for sale. Apply with stamps. B. W. Richardson, R. No. 36, Peoria, Ill.

REBUILT Engines—We have on hand a number of rebuilt "Buffalo" engines, guaranteed, at greatly reduced prices. Write for bargain list. Buffalo Gasolene Motor Co., 1203-1305 Niagara Street, Buffalo, N. Y.

CLOSING out entire line of Stickney engines. Brand new and guaranteed by the manufacturers: List price less 25% F. O. B. Bridgeport. Sizes 1¾—5—7 hp. Waldorf Motor & Machine Co., 135 Cannon St., Bridgeport, Ct.

FOR Sale—One 40-inch Sturdevant planing mill steel exhaust fan, single exhaust. Sellers have no use for same and will sell at a bargain. Jno. H. Swisher & Son, Newark, Ohio.

FOR Sale—Smith-Hubbard, Wabash, Indiana, Gas engine, planer, flooring machine, mortiser; cutoff saw; other equipment. Write for particulars: Bargain.

OTTO Gas Engine 10 H. P. with gas bag, muffler, pulley, batteries, etc., for gas or gasoline, cost $425 sell for $225. Warren Webster & Co., Point and Pearl Sts., Camden, N. J.

FOR Sale—200 new lathe chucks. Send for list. Lucas & Son, Bridgeport, Conn.

FOR Sale—Dynamo D. C. ½ H. P.; 50 Volt; 6 Ampere. In very good condition. Cost $35. Will sell for $17.50. D. Nelson, 1128 Oak Grove Ave., Chicago.

WILL sell at a bargain, Storage Battery, 60 Ampere Hour, 6 volts. Excellent condition. Cost $40. First $26 takes it. D Nelson, 1128 Oak Grove Ave., Chicago.

FOR Sale or Trade—Steam boilers of every description. Leavenworth Boiler Works, Leavenworth, Kan.

6 H.P. TWO cycle marine engine $45. Badger Motor Co., Milwaukee, Wis.

SELF-Setting Planes on trial. Gage Co., Vineland, New Jersey.

PATTERN makers! A book devoted to the principles of pattern and core making and molding. Written by G. H. Willard, a practical pattern maker of years' experience. This book, just published, treats the subject in a much more simple, direct and effective manner than most books along this line. 224 pages, 213 illustrations. Price $1 postpaid. Popular Mechanics Book Dept., Chicago.

SERIES of 8 lithographic models—Steamship, automobile, locomotive, gas engines, steam engine, steam turbine, wireless telegraph and dynamo. Size 8x14 inches. All parts of these machines are shown and numbered to correspond to printed keys of names. Price each, 50 cents, postpaid, or set of 8, $3.50, postpaid. Popular Mechanics Book Dept., 318 W. Washington St., Chicago.

MECHANICAL ENGINEERS

MACHINE designing, working drawings, experimental machinery. Cary L. Abbott, Mechanical Engineer, 1241 Unity Bldg., Chicago.

EXPERT designing of special machinery, jigs, fixtures and dies, for rapid production at low cost. Eastern Engineering Company, Dorchester Station, Boston, Mass.

MACHINE, Experimental Designing and Working Drawings. Western Engineering Co., 326 W. Madison St., Chicago.

SPECIAL machinery and labor-saving devices designed and built. Ideas developed and inventions perfected. Send drawing or description for estimate. G. Lange, Designing Engineer, 95 Washington St., (Opp. City Hall), Hoboken, N. J.

MANUFACTURING MACHINERY

MECHANICAL, Electrical, experimental and development work. We make Models practical for display, advertising and manufacturing purposes. Novelties, etc., made to order. Send for estimate. Miniature Mechanical Mfg. Co., 10 So. 5th Ave., Chicago.

WE make working models and carry a complete stock of brass gears and model supplies. Send for catalogue. The Pierce Model Works, 3405 Pierce Ave., Chicago, Ill.

WANTED—Pattern and light Machine Work. Send drawing for estimate on your machine complete. Inventions developed. Modern Pattern Shop, Detroit, Mich.

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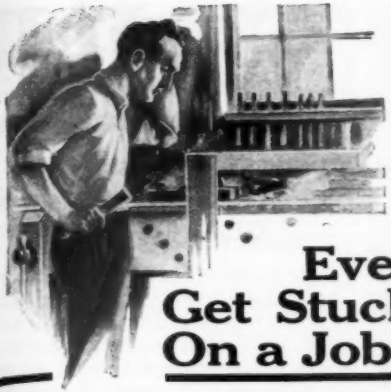

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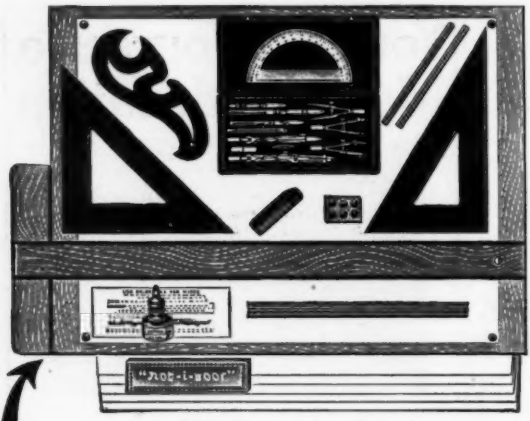

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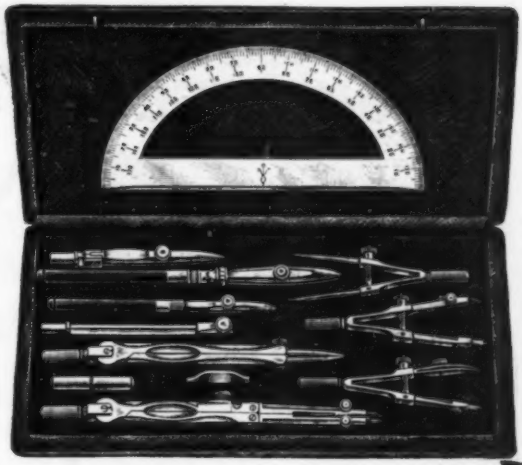

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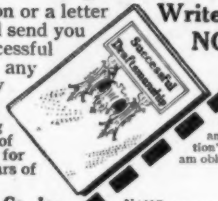

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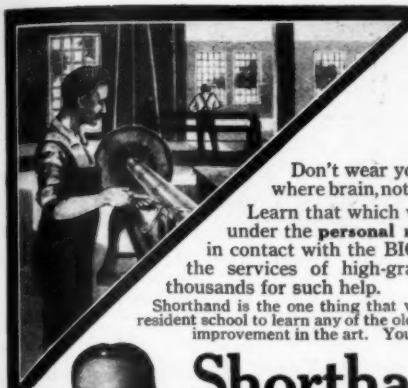

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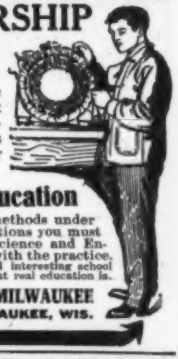

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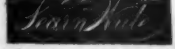

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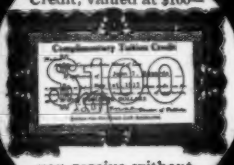

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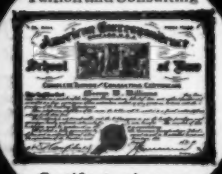

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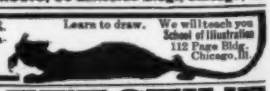

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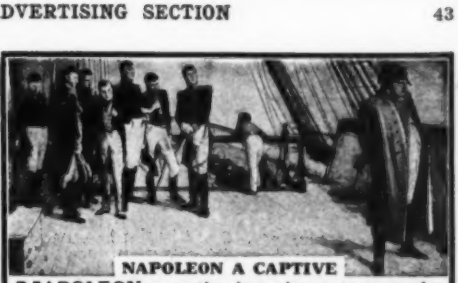

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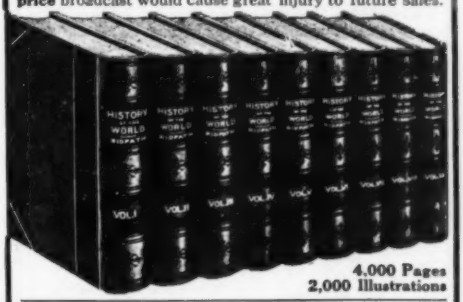

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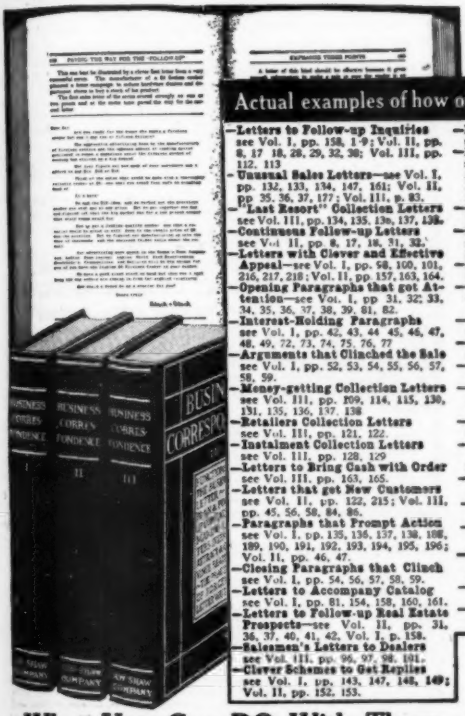

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Popular Mechanics Magazine
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Vol. 19 MAY, 1913 No. 5

Aeroplane-Destroying Guns for Submarines

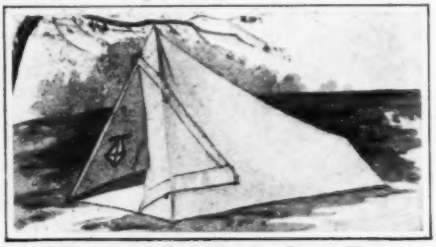
THE development of the aeroplane as an instrument of modern war has for some time been considered as an additional menace to the submarine, for, flying several hundred feet overhead, the airman can locate submarines even when they are moving at a considerable depth and send warning of their presence to a battleship by wireless. Thus it was thought that the aeroplane would have the submarine at its mercy, for the submarine hitherto has had no means of destroying enemies in the air.

Now, however, the Krupp gun works in Germany is making a quick-firing gun designed especially to provide submarines with the means of destroying aeroplanes and dirigibles. This gun,

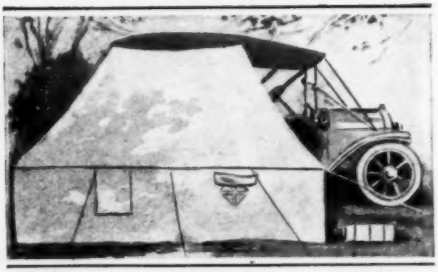
which can be fired at any angle, is mounted on a disappearing carriage which sinks into a well and is automatically covered with a water-tight slide when the submarine is submerged. The weapon can be raised from its well to the deck and made ready for firing in 30 seconds. The disappearing carriage is operated by electricity. When an aeroplane or dirigible appears overhead, the submarine so equipped may rise to the surface, the gun be trained upon the enemy, and a rapid bombardment ensue.

TENTS FOR AUTOMOBILISTS AND HUNTSMEN

The larger of the two tents shown in these illustrations is designed especially for the motorist. The other is



A Huntsman's Tent, Showing Canvas Floor and One of the Ventilators

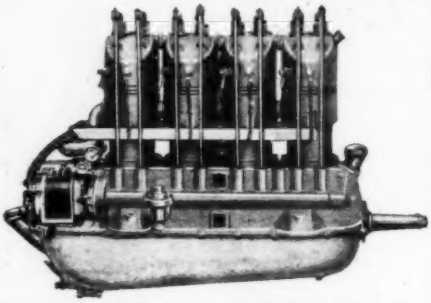


A Handy Canvas-Floored Tent for the Motorist

an excellent outfit for the hunter or fisherman. The most important features of these tents are the canvas floor, which forms one piece with the sides and back, the absence of tent poles, and the arrangement of protected ventilators. The canvas floor prevents bugs or snakes from entering the tent, and, when the floor is stretched over a bunch of leaves and grass, a soft, dry bed is provided. The ventilators, of which there are four to a tent, are all adjustable from the inside, allowing as much or as little fresh air to enter as is desired. The tents may be erected by throwing the roof lines over the branch of a tree and making fast. The larger of the two tents folds into a package but 7 in. in diameter and 20 in. long.

GERMAN AERIAL MOTOR WINS BIG PRIZE

The prize of $10,000, which the German emperor offered on his birthday last year for the best German aviation motor constructed before his anniversary this year, was awarded to an inventor who built a 100-hp., 4-cylinder motor along such lines that it is practically proof against breakdowns. The apparatus is, in reality, two motors in one, as duplicates are provided for all the important parts, each of which is capable of taking up its proper functions while the engine is running at full speed. That is, each cylinder has two magnetos and two carburetors that are operated independently of each other, and the other parts are arranged and operated in a similar manner. A total of 45 motors, representing 26 makers,



German Aviation Motor That Won a $10,000 Prize

were entered in the contest, and only three days were allowed for the assembling of each motor.

BEAUTY AND UTILITY COMBINED IN A SKYSCRAPER

Standing at the junction of three streets and facing an open plaza, this office building in Buffalo, N. Y., occupied by an electric-lighting company, is easily the most striking architectural feature of the city.

ASBESTOS POCKET FOR LIGHTED CIGARS

The new rule in Philadelphia, and some other cities, that anyone carrying a lighted or dying cigar into a street

Asbestos Pockets for Men Who Carry Lighted Cigars onto Philadelphia Street Cars

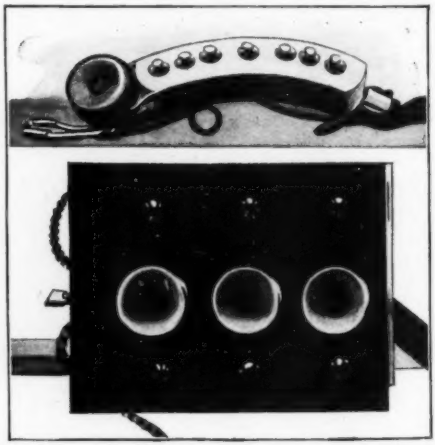
car must be made to throw it away or be put off, has caused a Philadelphia tailor to equip the suits of the smokers who patronize him with an asbestos pocket. The lighted cigar can be thrust into this pocket without fear of burning the suit, and, when the flap is buttoned down over it, the smoke cannot filter into the car.

DENMARK BUYS ELECTRICITY FROM SWEDEN

One of the most interesting examples of international transmission of electrical energy is that of Sweden to Denmark, where the power cable is carried under water part of the way. Arrangement has been made to transmit 20,000 kw. from the Trollhättan power station in Sweden to Copenhagen, the capital of Denmark, the distance being 200 miles. The method of transmission is to be by direct current at 90,000 volts, which is said to be more practicable for crossing the Sound than the three-phase alternating current usually preferred for long-distance transmission.

ELECTRIC SIGNALING DEVICE FOR BUILDERS

An electrical signaling apparatus, recently tried out on the new municipal building in New York City, has demonstrated that it is no longer necessary for workmen on high buildings to use ropes as a means of sending signals down to the engineer in charge of the hoisting machinery. In the new method of signaling the signalman on the building wears a belt to which is attached a number of push buttons and one end of a copper wire cable running down to the engineer's station. The lower end of the cable is connected to a series of colored electric lamps and electric horns mounted upon a suitable box placed conveniently near the engineer. The signalman, by simply pressing the proper buttons upon his belt, operates certain lamps and horns below, thus conveying the desired signals to the engineer almost instantaneously. It is said that the apparatus enables the signalman to control the movement of the load as well as if he were actually operating the hoisting engine.



Push-Button Belt Worn by Signalman on Building

Below: Electric Lamps and Horns at Hoisting Engineer's Station

THE AUTOMOBILE CHAPEL "ST. PETER"

The Tent Arrangement, Used in Rainy or Excessively Hot Weather

Ready for a Service

The first automobile chapel ever constructed in this country is being used by the Catholic Church Extension Society in the sections of the southwest where the members of the church are too widely scattered to have stationary churches or chapels. It penetrates regions which railroads do not reach. Starting from Brownsville, Tex., the traveling chapel, in charge of two priests, will work its way along the Rio Grande, westward through the state.

The equipment includes all the usual essentials for carrying out the rites of the Catholic church in regular form and with appropriate solemnity. The folding-door construction of the sides of the car and the ingeniously installed drop platform double the floor space when services are being held. In the center of the extension platform is a handsome combination altar and vestment cabinet, with its ornamental brass accessories. Along the outer edge of the platform are fitted demountable brass standards, with heavy silk-cord guards. In the ecclesiastical equipment are included a folding confessional, a folding organ, and a folding rack fitted with large tubular bells to call the worshipers to service. When the altar is not in use

The Automobile Chapel on the Road

it is pushed to the extreme rear and the space in front is used by the priests as living quarters.

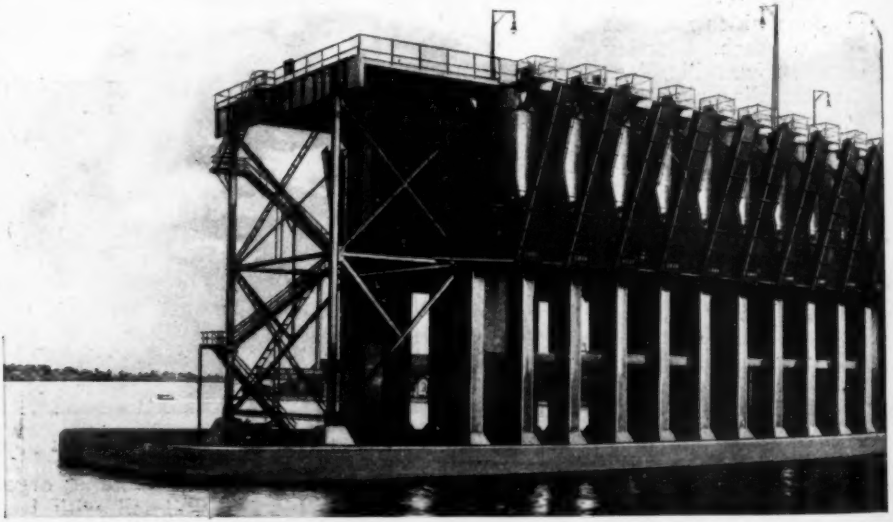
The general dimensions of the car are: length over all, 21 ft.; width, 6¾ ft.; height from the ground, 11¾ ft. On top of the machine is carried a 20 by 50-ft. gable-roof khaki tent, which is erected with the automobile chapel inside, at one end, when shelter from rain or from the heat of the sun is required. The sides and back of the car contain eight artistically executed stained-glass windows.

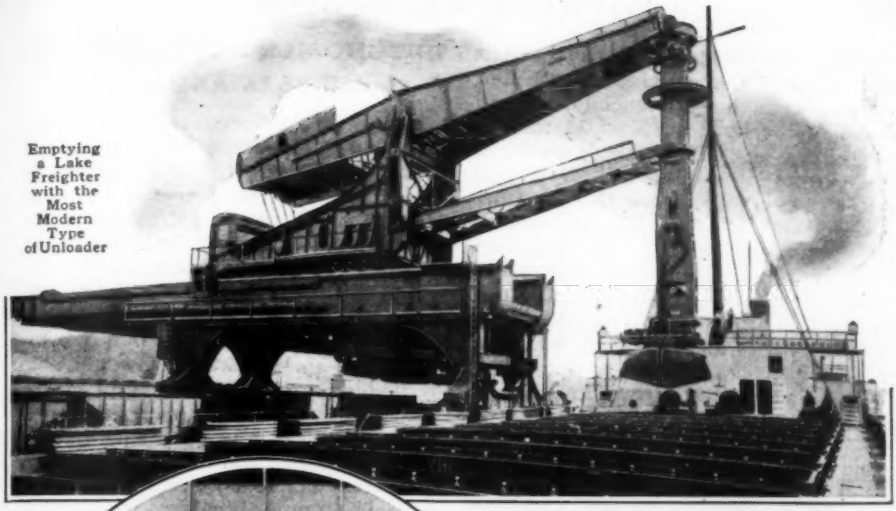
THE ORE-HANDLING MACHINES OF THE GREAT LAKES

It is not surprising, considering that the amount of iron ore handled on the Great Lakes each year is in the neighborhood of 45,000,000 net tons, that the ore-handling apparatus at Duluth-Superior, which is the great receiving port, and at the ports of the lower lakes, where the ore is unloaded, are the most highly specialized in the world, and that the cargoes are handled in less time and at less cost than in any other ports on salt water or fresh.

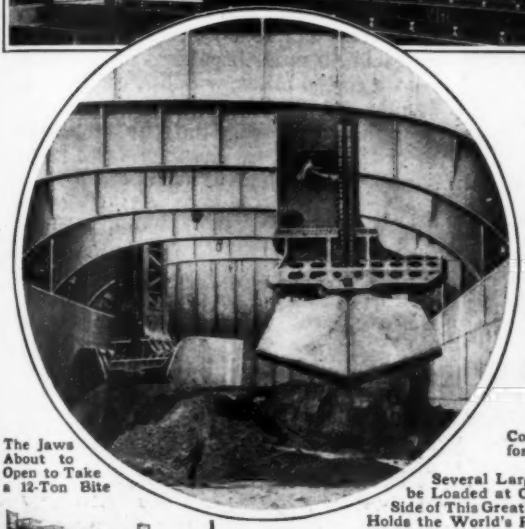
The Great Northern ore dock at Allouez Bay, Superior, Wis., an immense steel and concrete structure, made the world's record for loading when 10,592 net tons of ore were delivered into the hold of the "W. E. Corey" in 25 minutes. The ore is hauled to the dock in hopper-bottomed cars and dropped into storage bins or pockets. When the ship comes alongside the dock the chutes are let down, the slides drawn up, and the ore goes rushing into the hold at the rate of hundreds of tons a minute, the big ship sinking swiftly down into the water. The vessel shown alongside this dock is nearly 600 ft. long.

The most modern type of unloader is to be found in operation at Cleveland. Its huge jaws will take a 12-ton bite of ore at once. The operator rides into the hold in a little compartment just above the jaws. Although unloading cannot be as rapid as loading, the speed with which these machines work is remarkable. One of these un-

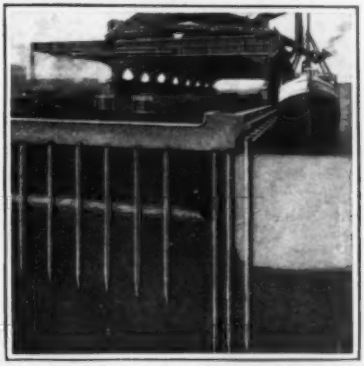




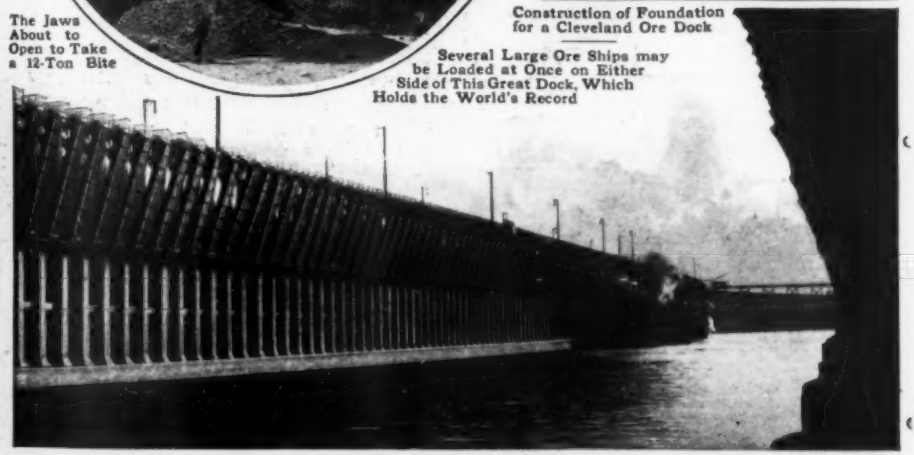
Emptying a Lake Freighter with the Most Modern Type of Unloader



The Jaws About to Open to Take a 12-Ton Bite



Construction of Foundation for a Cleveland Ore Dock



Several Large Ore Ships may be Loaded at Once on Either Side of This Great Dock, Which Holds the World's Record

loaders took 2,093 net tons of ore out of a ship in 2 hours and 50 minutes, which means that the machine reached down in the hold, grabbed 12 tons of ore, lifted it out, backed up, and dropped its load into a waiting freight car once every minute without a stop.

Large unloaders of this type require substantial foundations. In the outer harbor at Cleveland the bottom of Lake Erie is of soft clay, so a fill of steelmill and railroad refuse was made to bring the grade to about 5 ft. above the level of the lake. More than 5,000 concrete piles were driven to provide a solid foundation.

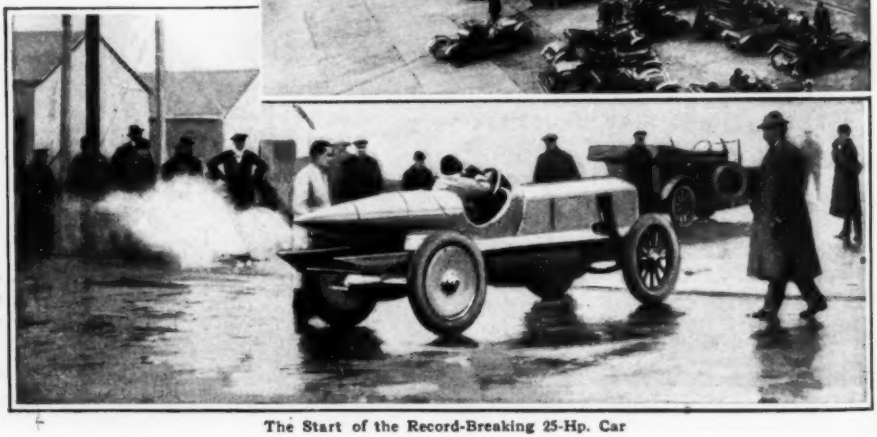
AUTOMOBILE RUNS HUNDRED MILES IN AN HOUR

There is a difference between running 100 miles in one hour and at the rate of 100 miles an hour, for, although the latter has been exceeded by more than 25 miles on at least two or three occasions, the former has just been attained for the first time. This ambition of automobile-racing enthusiasts was realized recently at the famous Brooklands track, in England, and by a little 25-hp. car, which is doubly remarkable, since many attempts have been made to achieve the 100 miles in an hour with cars of up to 200 hp.

The little car, driven by Percy Lambert, traveled, to be exact, just 103¾ miles in 60 min., breaking the world's record for 50 miles, which it covered in 29 min. 2.5 sec.; for 100 miles, made in 57 min. 49.38 sec., and the one-hour record. The old hour record was slightly more than 97 miles.

Percy Lambert at the Wheel

Scene During the Record-Breaking Run



The Start of the Record-Breaking 25-Hp. Car

JAPANESE BUILDING SHIPS TO USE PANAMA CANAL

A fleet of large steamers to be used by a Japanese steamship company for a line running from Japan direct to New York by way of Hongkong, Manila, Honolulu and the Panama Canal is being constructed. Six large freight vessels are expected to be ready by the opening of the canal. The trip is expected to take 41 days.

USEFUL SORTING DEVICE FOR OFFICE DESKS

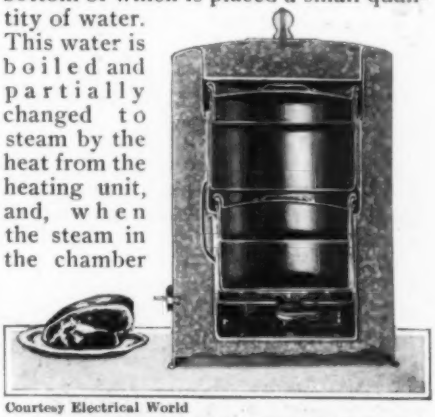
The letter-sorting device or distributor here shown is designed to take the place of desk baskets or trays and is so constructed that its capacity or

Distributor for Correspondence

compartments may be increased at will by simply inserting more leaves or partitions. The distributor, when fully set up, occupies practically the same space as one of the old-fashioned baskets, but has approximately the capacity of 15 of them.

AUTOMATIC ELECTRIC STEAM COOKER

An automatic electric cooker, which, it is claimed, will cook for four hours at a current-expense of but 6 or 7 cents, uses live steam as the medium for distributing the heat from the electrical unit to the food receptacles. These receptacles are contained within a hermetically sealed steam chamber, in the bottom of which is placed a small quantity of water. This water is boiled and partially changed to steam by the heat from the heating unit, and, when the steam in the chamber



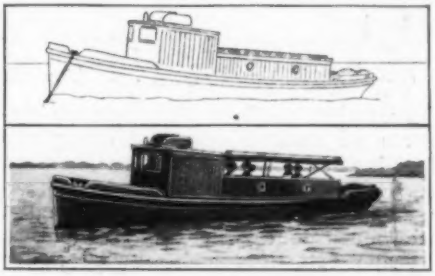
Courtesy Electrical World

Automatic Electric Cooker Using Live Steam as the Means of Distributing the Heat, and of Automatic Regulation

reaches a certain pressure the spring in a diaphragm is overcome, and this, acting upon a pin, opens a switch contact and interrupts the energy supply. A subsequent reduction of the steam pressure in the chamber allows the diaphragm to return to its original position, and the heating commences again.

ADJUSTABLE CABIN ROOF FOR MOTORBOAT

An interesting idea in motorboat-cabin construction has been carried out on the "Altge," a 26-ft. craft used for cruising on Puget Sound. In fine weather the cabin top is raised to the height of the pilot-house roof, but when a high wind is blowing and the sea rough, the top is dropped down, thor-

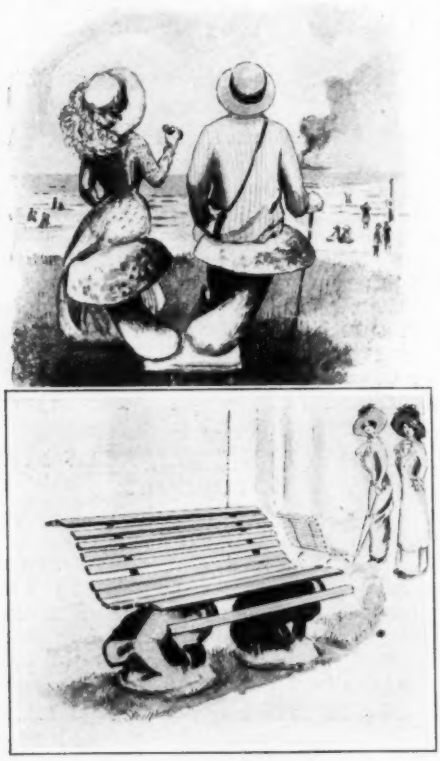


A Puget Sound Motorboat with Roof That can be Raised and Lowered

oughly protecting the passengers from spray, and also lowering the center of gravity and reducing the surface presented to the wind.

CEMENT MUSHROOMS AND GNOMES

Among the most uncommon uses to which concrete has been put in Belgium is the making of mushrooms for



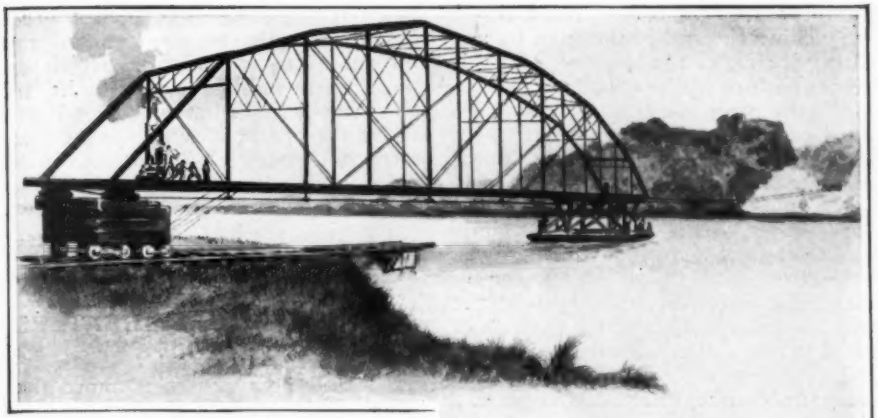
Mushrooms and Gnomes of Cement in Belgian Gardens

decorating gardens, and dwarfish figures of gnomes for supporting the garden seats. If the imagination were sufficiently elastic, it might be presumed that the gnomes had pillaged the mushroom garden at night and, to escape detection, had crawled under the seat, where they became concrete images.

BRIDGES ERECTED BY END LAUNCHING

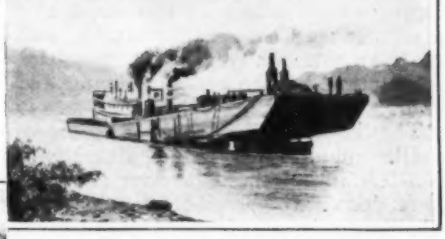
Two large bridges were recently erected by what is known as the end-launching method, which consists of floating one end of the completed span across the river on a barge, with the inner end mounted on railroad trucks. The largest of these bridges, a 475-ft. span, said to be the longest and heaviest ever erected by end launching, crosses the Monongahela River in Pennsylvania, and was erected under particularly severe conditions. The other example is a bridge over the Jaina River in Santo Domingo.

The Monongahela River bridge was constructed by a railroad completing an extension into the West Virginia coal fields. As the crossing is in the mountains close to the headwaters of the river, where rapid and wide variations in level occur, rises of 5 to 20 ft. in a few hours being comparatively frequent, the end-launching method was decided upon to prevent the work from being delayed by floods. While the span was being erected upon the shore, a steel barge, 200 ft. long and 36 ft. wide, was built for use in floating the outer end of the span across the channel. This barge had to be passed through two locks, one of which is 154 ft. and the other 164 ft. in length. The only way to get it through was to raise its forward end 10 ft. out of water, so that this end would project over the head walls of the locks. This was accomplished by supporting the forward portion of the barge on two auxiliary scows. Permission had also to be obtained from the government to build a temporary cofferdam a sufficient distance above the upper end of each lock to permit the closing of the lower gates behind the barge. The permanent head gates and the tail gates were then opened, the barge floated in with its front end projecting over the head walls, and the tail gates closed. Then the cofferdam was broken and the water allowed to flow in, raising the level to that of the upper channel.



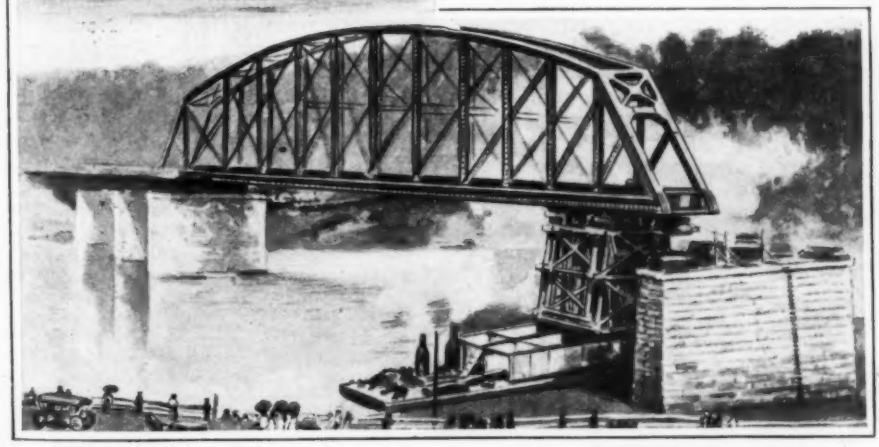
Forward End of Jaina River Bridge Being Projected across the Stream on a Barge, with the Inner End Carried on Trucks

When the barge was at last in position for its task, it was sunk until it floated just above the water, falsework was erected to a sufficient



Manner in Which the Barge for the Monongahela Bridge had to be Floated to Get It through the Locks

height to float the end of the bridge above the pier on which it was to rest, a time was selected when the stage of the river was right for the operations, then the water was



The Position of the Span During the Flood Which Raised the River Level 29 Ft. above Normal

The Monongahela Bridge Approaching Its Final Position

pumped out of the barge until it rose 2 ft., picking the end of the span up and lifting it clear of the blocking. At this point, with everything in readiness to move the span, an exceptionally high flood occurred, the water rising 29 ft. above its normal stage in six hours, with the current moving at a speed of 25 miles an hour. Great cables held the barge in position under the span while the flood lasted, during which it was only saved from filling with water by the quick erection of a water-tight wooden bulkhead around it, as it had tilted to one side when it rose with the end of the span. Although danger of complete disaster faced the engineers during every minute of this flood, the equipment withstood the strain, and the span was finally moved across, the actual time of the crossing being six hours.

The highway bridge erected in a similar manner across the Jaina River is 330 ft. in length. The river is about 50 ft. deep at the point of crossing, and the bottom is so soft that the ordinary method of erecting such bridges could not be used.

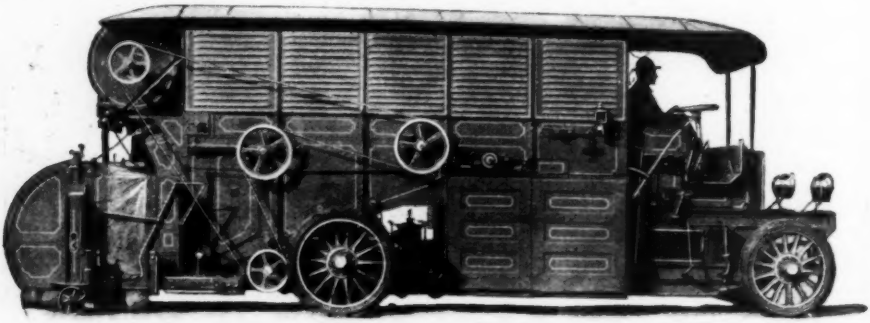
A SANITARY STREET SWEEPER

The city of Oakland, Cal., is cleaning its streets with a motor-driven sweeper that is practically noiseless and raises no dust, even when operated on unwatered streets. It operates upon the principle of both the ordinary carpet sweeper and the vacuum carpet cleaner; that is, the rear part of the machine contains a revolving brush that sweeps the heavier articles from the street to a conveyor, which deposits them into a series of tanks, and two fans, immediately behind and above the brush, suck up the dust and force it through cloth tubes to metal tanks in the forward part of the machine. The machinery is driven by a gas engine which is also used to propel the vehicle.

MOTION-PICTURE THEATERS IN EUROPE

England now possesses more than 4,500 motion-picture theaters, with a seating capacity of 2,000,000, representing a capital outlay of $63,264,500. It is estimated that 28,000,000 people attend these theaters each week. Motion pictures are also particularly popular in Germany, and an extensive censorship is maintained. In Breslau, for instance, this is done by the police department, and before a film can be exhibited it must be tested on a police machine at headquarters. The films examined average about 200 per week, and four regular days have been set for the task.

¶The government recently placed a quarantine on lumber and other forest products from sections of New England infested with gypsy and brown-tail moths, in order to prevent the spread of these pests through the country.



Sanitary Street-Sweeping Machine Used in Oakland, Cal.

U. S. WIRELESS STATION AT BALBOA

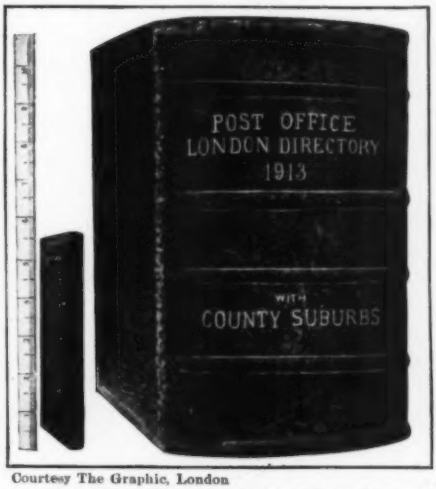
The United States has bought the wireless apparatus which the Republic of Panama intended to install on the National Palace and it is being erected by the United States Marine Corps at Balboa. One of the smokestacks at the Isthmian Canal Commission's electric plant is used to support the flat-topped antennae. The apparatus will use a 25-cycle, 3-phase current, giving a wave length of 600 meters (1,968 ft.), for communication with ships within a 500-mile radius. The government wireless station at Colon is now transmitting commercial messages to ships at sea at a charge of 8 cents a word.

COLD-WATER BOTTLES FOR HOTEL ROOMS

The ice-water brigade in hotels will be a thing of the past if the makers of a line of vacuum bottles succeed in generally installing the vacuum carafe especially designed for hotel rooms. The iced or chilled water placed in these bottles will retain its coldness for two days.

LONDON DIRECTORY NOW AND TWO HUNDRED YEARS AGO

The first London directory, dated 1677, is here set up beside the 1913 directory, to show how the annual volume has grown. The first directory contains 120 pages, and is 5½ in. high and ¾ in. thick. It is a collection of the names of the merchants living in and about the City of London 236 years ago, and is described as "very Useful and Necessary, Carefully Collected for the Benefit of all Dealers that shall have occasion with any of them; Directing them at the first sight of their name, to the place of their abode."

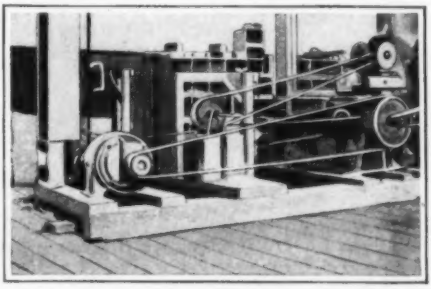


Courtesy The Graphic, London

London's First Directory, Dated 1677, as Compared with the 1913 Directory

PORTABLE MACHINE SHOPS FOR BUILDING WORK

The practicability of installing temporary, electrically driven machine shops in buildings under construction, to do the many small things that are always cropping up in building erection, has been demonstrated in the erection of an electric-railway substation at Brookline, Mass. The portable shop set up in the basement of this building consisted of a 5-hp. motor, the required pulleys, a hacksaw, a grinder, and several other small tools, all mounted on a timber frame.



Portable, Motor-Driven Machine Shop in Basement of Building under Construction

Copyrighted by Brown & Dawson, Stamford, Conn.

The Railroad of the Future—Hauling freight trains with electric locomotives, as is now done on the main line of the New York, New Haven and Hartford Railroad, shown here, will soon cease to be a novelty as electricity gradually supplants steam for motive power

A GAS CHANDELIER OF IMMENSE SIZE

This gas chandelier, which is one of four fixtures of similar size used in illuminating the interior of an immense auditorium in Atlanta, Ga., is claimed to be one of the largest ever made for gas lighting. The fixture is 10 ft. high, has a diameter of 13 ft., weighs 1,000 lb., and uses 15 lamps that produce 10,680 cp. from a gas consumption of 275 cu. ft. per hour.

Gas Chandelier, 13 Ft. in Diameter, Giving 10,680 Cp. of Light

ENGLAND TO REPEL GERMAN AIR INVASION

The fear of a German invasion, which is widely prevalent in England, has been greatly stimulated in the last few months by reports from many points of mysterious air craft seen by day flying at great heights over various navy yards, arsenals and fortifications, and apparently well-authenticated reports of night visits from airships, of which the moving lights and the noise of the engines gave warning. As it is known that Germany possesses an aerial navy of considerable size, and that several of its war dirigibles have made quite extended trips over the sea, it is believed in the United Kingdom that these strange air craft are German spies or scout ships sent out to test the possibility of a successful assault from the air.

The British Parliament has officially recognized the danger of an aerial invasion by enacting, at the instance of the War Department, a law prohibiting the passage of air craft over certain areas or, if the government deems it necessary, over the whole coast line and adjacent waters. If any aerial vessel infringes this law, the proper officers are authorized, after giving a prescribed warning signal, to fire at and destroy such air craft.

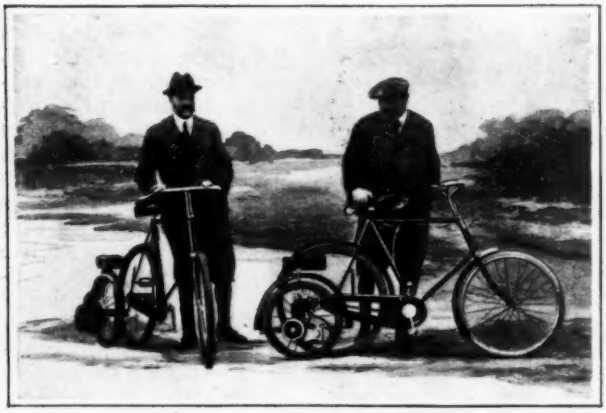
Long-range rifled cannon, mounted so that they can be aimed at objects in the air, have been bought by the British authorities and mounted at various points along the coast.

SLATE OIL RUNS ENGINES

The production of oil suitable for fuel in engines of the Diesel type from shale and slate has been undertaken in Sweden with excellent results. Shale oil is being produced in England and Scotland, and oil extracted in Sweden by the same method shows excellent results under careful operative tests.

CONAN DOYLE USES AUTO-WHEEL BICYCLE

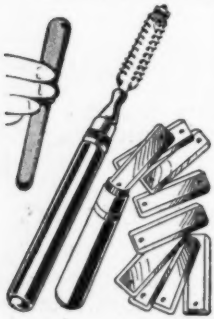
The auto wheel is an ingenious auxiliary wheel provided with a tiny motor, designed to run alongside the rear wheel of the ordinary bicycle, being attached to the frame by means of special couplings. Sir Arthur Conan Doyle, of Sherlock Holmes fame, is here shown using one of these machines.



Sir Arthur Conan Doyle and a Companion Using Auto-Wheel Bicycles

PENLIKE SAFETY-RAZOR HOLDER

To take out of the vest pocket what appears to be a fountain pen, and then proceed to shave with it, is what happens when the users of a new safety razor set about harvesting the facial crop of each day. A dozen blades are carried in the head of the holder. The blade-holding end of the razor unscrews and is carried in the lower portion of the penlike handle when not in use.



PUBLIC DRINKING CUPS NOW FORBIDDEN IN 22 STATES

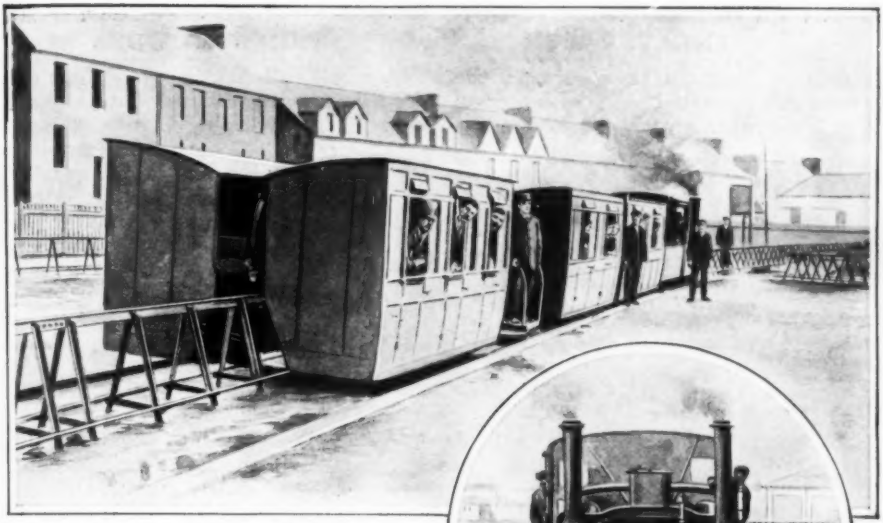
The campaign against the common drinking cup has resulted in its abolition by law in California, Colorado, Connecticut, Idaho, Illinois, Iowa, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, New Hampshire, New Jersey, Oklahoma, Oregon, South Dakota, Texas, Utah, Vermont, Washington and Wisconsin.

The perils of the public drinking cup were demonstrated by experiments made in the Chicago Board of Health laboratories. Guinea pigs were treated with material taken from the rims of public-school cups. Five developed abscesses in 72 hours; five died from pus infection and one from diphtheria.

Even "sanitary" cups that can be folded up and re-used have been condemned by some health authorities, only paper cups that are so fragile as to be practically self-destroying being recommended as a substitute for the common cup.

STORAGE-BATTERY CAR MAKES LONG RUN

The first of the new storage-battery cars built for suburban service on the New York Central lines recently made a trip from New York to Boston, a distance of 310 miles, stopping in Poughkeepsie an hour to have its batteries recharged. The trip was the longest and fastest ever made by a car driven by storage batteries, the speed attained during the run being 40 miles an hour. The run was made in less time than the local steam trains require for the trip, but was somewhat slower than the expresses.



A Train That Straddles the Rail Like a Boy Straddles a Fence

IRELAND HAS "STRADDLE" RAILWAY

Running between Ballybunnion and Listowel, in Ireland, is a unique "peg-leg" railroad, so called because it runs astraddle a single rail, elevated a suitable distance above the ground. The entire weight of the train is carried by this rail, guide rails being arranged nearer the ground to keep the train balanced. Each coach consists of two compartments, one on each side of the elevated rail, and the engine has two boilers, fire boxes and smokestacks. A short railway of similar nature was in operation between Stratford and Gilmour, Pa., about 1878, and another was a feature of Coney Island many years ago.

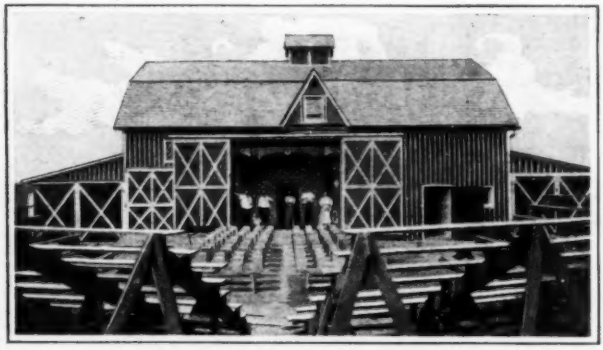
SHAKESPEARE'S "TRICK" STILE

This unique "trick" stile, in the fence of Charlcote Park, Stratford-on-Avon, is, like almost everything else in the Shakespeare country, associated with him in story. According to this particular story, Shakespeare had purloined a small deer from one of the herds in the park, and was escaping with his spoil when seen by the gamekeepers. They set off in pursuit, but he outdistanced them until, reaching the boundary of the park, he attempted to vault over the stile, which collapsed under his weight, pitching him to the ground.

A "Tumbledown" Stile Associated with a Youthful Escapade of Shakespeare

BARN AS STAGE OF OUTDOOR THEATER

Around Sherman Lake, one of the innumerable small bodies of water in New York State, gather many cottagers and campers during the summer months. Facilities for amusement, other than those provided by the lake and the surrounding farming country, are scarce, so the owner of a farm near the lake turned his barn into a unique theater. Benches and seats of the circus type, placed in the open air, accommodate the audience, while the central entrance of the barn is the stage.



Barn Converted into Stage for Outdoor Theater. The Big Doors Serve as the Curtain

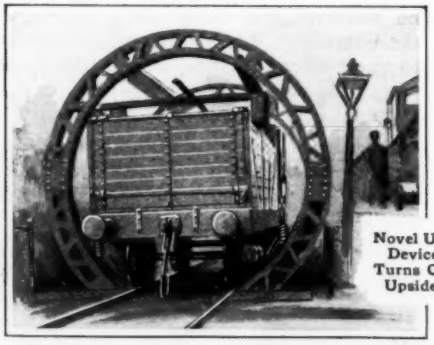
The big sliding doors, which are opened wide in the haying season to allow the loads to enter, serve as the stage curtain. Five sets of scenery, all made of wall paper, are used. Such a theater, is available wherever there is a barn.

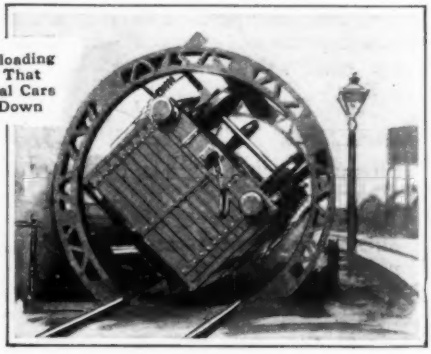
TEMPERATURE RECORDED AT HIGH ALTITUDES

A small balloon, carrying apparatus for recording conditions of atmosphere, sent up by Professor Gamba, director of the observatory at Pavia, Italy, reached an altitude of a little over 23 miles. At this height the temperature was 67 deg. F. below zero, and the barometer registered a pressure of only .11 in. The lowest temperature found was 70 deg. below zero, at an altitude of 12 miles. The balloon reached the highest altitude in 1 hr. 18 min., and descended in about 46 minutes, having in the meantime traveled about 90 miles from the point where it was sent up.

TURNS CARS UPSIDE DOWN TO UNLOAD COAL

A novel device for rapidly unloading gondola coal cars has been adopted by an English railroad at one of its terminals. The car is run onto a section of track extending between two circular steel frames, which form rings large enough to admit the passage of the car. A clamping device holds the car fast to the track when in position, and track, car and all are then rotated until the car is practically upside down,





Novel Unloading Device That Turns Coal Cars Upside Down

and its contents are discharged into a pit under the track, from which an automatic conveyor carries the coal to the storage pockets.

SMALLER HORSEPOWER FOR AUTOMOBILES

Commenting upon the fact that the horsepower of American automobiles is excessive, contrasted with that of the European product, the Automobile says that an accurate survey of the cars listed for 1913 points to a distinct tendency to reduction. The average horsepower of the various four and six-cylinder cars is considerably lower than last year, and, if the price of fuel advances, there may be further reductions in 1914.

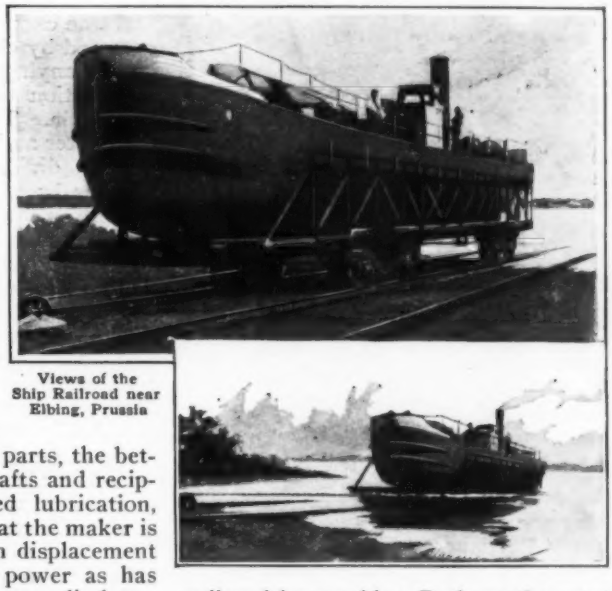
Due to the fact that added efficiency is being obtained by changing valve timing, keeping dust out of working parts, the better balancing of crankshafts and reciprocating parts, improved lubrication, and the like, it is said that the maker is able to reduce the piston displacement and yet have as much power as has been available with larger cylinders.

COST AND PROGRESS OF PANAMA CANAL WORK

The total amount of money spent by the United States in construction and engineering work on the Panama Canal to February 1, 1913, was $167,538,493.65. Of this amount, $8,282,419.20 had been spent on the Gatun Dam. For this sum of money 118,100,749 cu. yd. of earth had been excavated by dry excavation, and 72,791,530 cu. yd. by dredging. The Culebra Cut accounted for 89,666,817 cu. yd. of this work and there remained to be excavated 27,246,020 cu. yd. to complete the canal.

A SHIP RAILROAD OF PRUSSIA

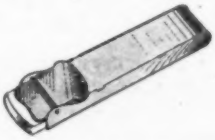
This ship railroad, which is in operation near Elbing, Prussia, shows the novel means adopted for conveying a barge over dry land when it was found impracticable to make the canal a continuous body of water. The barge is floated over a large platform mounted on wheels, which is then drawn out of the water onto the track and along the railroad by a cable. Perhaps the most remarkable of similar projects was the Eads ship railroad over the Tehuantepec Isthmus, Mexico, which was never built.



Views of the Ship Railroad near Elbing, Prussia

A NOVEL INK ERASER

This eraser is contained in a German-silver holder, so designed that the rubber is fed forward as desired by simply depressing the small lever. By this means the rubber always presents a sharp and clean erasing surface.



"CARPET SLIPPERS" FOR HORSES

Cloth shoes or "foot bags," having the bottoms formed of carpet, were made last winter by the Oregon

Showing the Sides and Bottom of a "Carpet Slipper" for Horses

Humane Society and put to practical use in Portland to prevent horses from falling on slippery pavements, and to help them regain their feet when they are once down. When not in demand, these "shoes" may be used by the driver as a cushion. The society manufactured several hundred of these shoes last winter, the cost being about 10 cents each. The large teaming concerns in Portland used them extensively.

DRESDEN HAS A MUNICIPAL NEWSPAPER

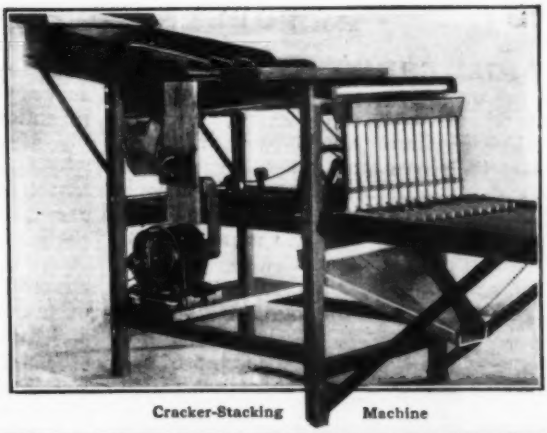
The newspaper known as the Dresdener Anzeiger is owned by the city of Dresden, having been willed to that municipality more than 50 years ago by its publisher, Dr. Justus Guentz, on condition that the profits should be used for the beautifying of the city and for charitable purposes. The owner of the publishing house which has printed the newspaper since 1848 recently gave the city his plant on the understanding that the profits should be expended in the same manner. The annual profits of the two gifts amount to about $60,000.

COMPLETE ELECTRIC BAKERY

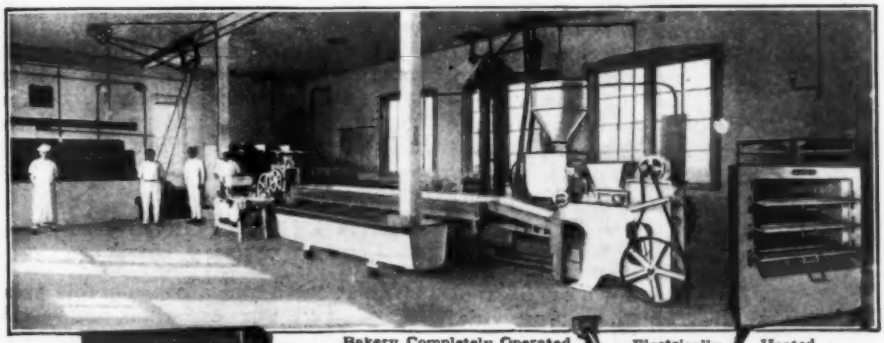
A fine example of a complete bakery operated by electricity is shown in the accompanying illustrations, the bakery in question being located in Muskogee, Okla. The machines include a flour lifter and conveyor, dough mixer, dough divider, loaf molder, loaf rounder, bread-rising belt, and cake machine. Included with these illustrations is also an interesting electrically driven cracker-stacking machine, and an electrically heated oven.

The process of bread making in a typical electric bakery is as follows: The flour is unsacked into a bin in the cellar and elevated by an electric flour lifter and conveyor into the large hopper above the dough mixer, the hopper being suspended from a lever connected with a scale beam so that it can be weighed at any time. After the dough is mixed it passes into rising tubs, and from the rising tubs into the dividing machine. With each revolution of the wheel of this machine, four loaves of any desired weight are punched out and dropped upon a delivery belt. An ingenious arrangement of small hoppers sift flour into the dough at the proper intervals to avoid any tendency of the dough to stick. A minute after a loaf drops upon the belt it is delivered to the molding machine, which kneads the loaves exactly as the old-fashioned baker did, turning them twice from end to end, then twice from the side, and finally rolling them around the wheel at the bottom. The loaves then roll into a pan and are carried to the oven, all of these operations being performed by electric motive power, and the electric current supplies the baking heat.

The Loaf Rounder

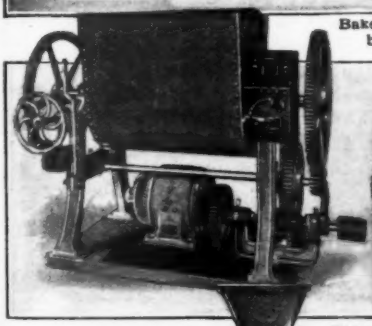


Cracker-Stacking Machine

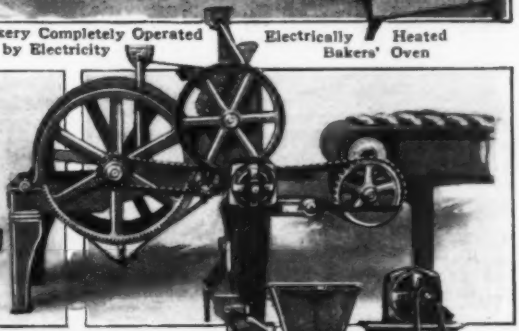


Bakery Completely Operated by Electricity

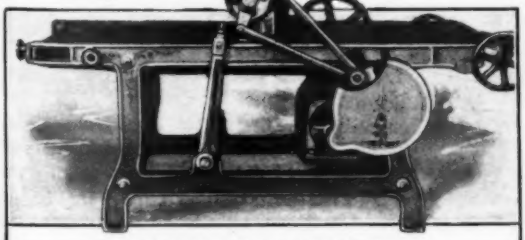
Electrically Heated Bakers' Oven



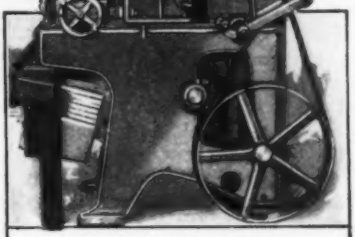
Dough Mixer



Rising Belt and Loaf Molder



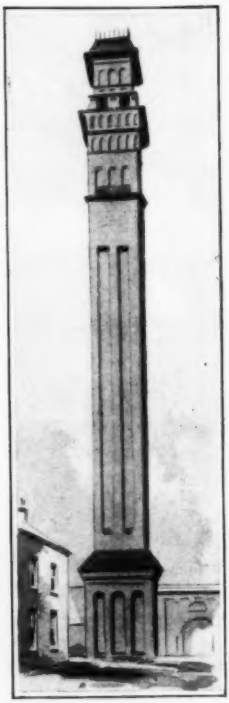
Cake Machine with an Electric Motor



The Dough-Dividing Machine

MILL CHIMNEY A COPY OF VENETIAN CAMPANILE

A mill chimney at Darwen, England, said to be the most magnificent in the world, is a copy of the famous Campanile of Venice. It was erected 55 years ago, at a cost of $60,000. The ownership of the land upon which it stands was in dispute, and it was agreed that the claimant who should put up the most expensive structure for practical use should have the land. The chimney was erected and as the consequence the mill owner became the proprietor. The total height of the chimney is 310 ft. The foundation is a solid block of stone, on which is a stone pedestal 42 ft. in height, bearing a massive stone cornice 35 ft. long on each side. The shaft rising from this pedestal is 24 ft. square, constructed of red, white and black brick, with sandstone trimmings.



GOVERNMENT TO OPERATE PANAMA FUEL STATIONS

Although it will not be the policy of the United States to attempt to monopolize the fuel business on the Panama Canal, and every means will be taken to encourage the establishment of private coal and oil depots, the actual operating plants will be owned and operated by the government. A certain ground area will be set aside for the storage of coal by individuals or companies, and this area will be served by the government handling machinery. This arrangement will obviate the necessity of any dredging, wharf construction, or purchase of coal-handling machinery by private concerns, and at the same time will enable them to obtain the benefits of the rapid coal-handling machinery to be purchased by the United States. The cost of taking coal in and out of storage, and of the wharfage facilities, will be apportioned at a reasonable price per ton among all individuals and companies on an equitable basis.

A government piping and pumping plant will also be installed for oil fuel. All the oil companies and dealers will have to do will be to construct tanks in the area provided, and run pipe lines to the oil wharves and pumps, which will be used for all vessels alike.

NEW TYPE OF GROUND FOR TELEPHONE WIRING

Moist earth and a considerable area of contact are essentials of good grounding, so this type of grounding device has been constructed. The three bowls or cups are covered with screens to keep the bowls from being filled with the surrounding earth, and in each bowl is a quantity of charcoal, which aids in attracting and holding the rain water which seeps through the soil. It is claimed that water will remain in the bowls a considerable time after the surrounding soil has lost its moisture. The area of contact with the earth is considerable, as these bowls act as a layer of copper and have their upper and lower surfaces exposed toward the earth.

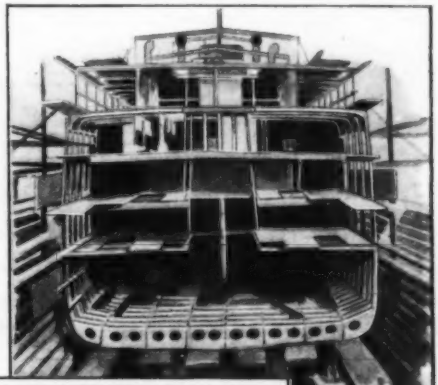
BICYCLES SUPPLANT CAMELS IN AFRICA

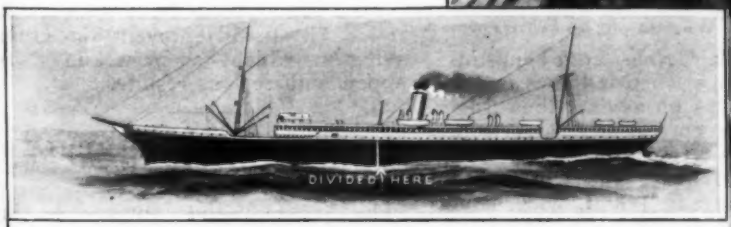
That bicycles are more useful for military purposes in Africa than camels is evidenced by the fact that more than 6,000 of these vehicles were ordered made and sent to Africa for the use of the Italian troops during the closing days of the Italo-Turkish campaign. A considerable number of the bicycles are to be constructed with unusually high frames, the driving gear being about 12 in. above the usual position, so that the pedals will not strike upon rocks and stones when the machines are being propelled across the desert.

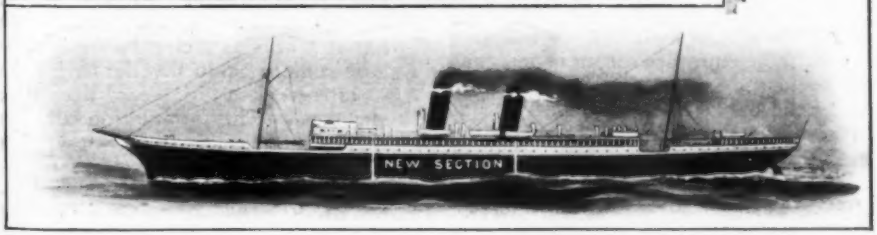
LENGTHENING AN OCEAN LINER

An interesting feat of engineering construction was recently completed in England when the ocean liner "Marathon," a steel vessel 454 ft. long and 55 ft. broad, was lengthened to the extent of 50 ft. The operation of cutting out the rivets preparatory to severing the vessel was done entirely by hand and, while this work was proceeding, suitable supports for holding the ship in position, when divided, were laid beneath the hull in such manner that a clear space was left on each side for putting in the additional length.

Upon the completion of the rivet cutting the forward part of the vessel was drawn away by block and tackle. The line of severance was forward of the cross coal bunker at the fore end of the boiler compartment, and the boiler, engines, and machinery generally, were left intact in the stationary part of the hull. The work of filling the 50-ft. gap proceeded rapidly, as the necessary structural parts had been prepared beforehand and brought to the ship's side ready for putting into place. The liner now has an increased cargo-carrying capacity, which was the main object in view, and accommodation for about 30 additional passengers.



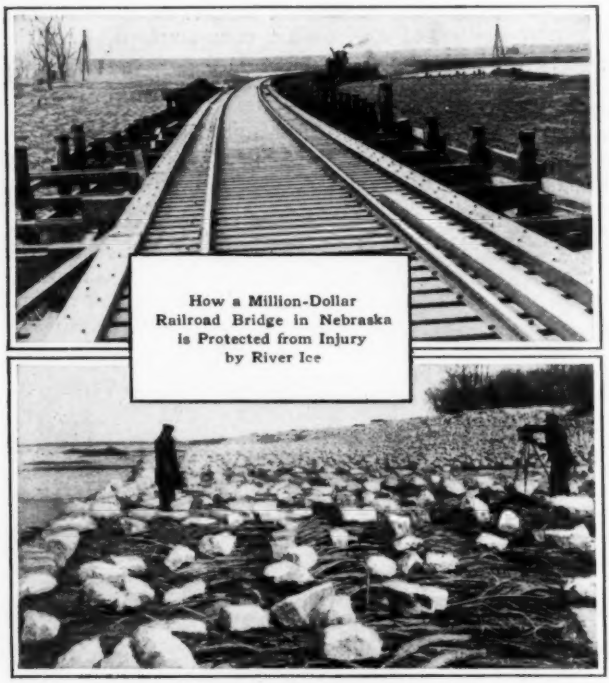




The "Marathon" before Being Cut in Two — The Liner Cut in Two, Looking Forward
The "Marathon" as It Now Appears, with New Section Indicated

PROTECTING RAILROADS WITH BRUSH MATS

The accompanying illustrations show the method of protecting a $1,000,000 railroad bridge across the Missouri River near Blair, Neb., from being injured by the ice when it thaws in the spring and piles up against the structure, thus preventing the water from passing. The protection consists of a mat woven of brush and wire cable, one mile long and 166 ft. wide, containing about 10,000 cords of brush weighted down with 600 carloads of stone. The riprap covering is designed to prevent the water from washing away the banks of the river as well as protect the valuable bridge when the ice breaks up.



How a Million-Dollar Railroad Bridge in Nebraska is Protected from Injury by River Ice

A Section of the Riprap or Brush Work, Containing 10,000 Cords of Brush Weighted with 600 Carloads of Stone

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¶A $5,000,000 company has been organized in London to operate lines of cargo vessels propelled by oil engines.

FILLING COAL MINES WITH SAND

The idea of filling the workings of coal mines more or less completely with sand or other waste material was originated by the anthracite operators in Pennsylvania. In the last few years it has been adopted extensively in various European coal-mining centers. Until this filling system was originated the custom was, and still is to a great extent, to leave a large percentage of the coal in place as pillars to support the roof. At present many of the collieries in the anthracite region are utilizing refuse from the old culm banks, flushing this fine waste underground so that the pillars may be reduced in size or removed. As a result the culm banks are now disappearing and soon will be gone, and sand will be used. The filling up of the worked-out mines will also prevent the crust caving in, which has been known to happen with serious results.

MARYLAND'S AUTOMOBILE LIBRARY

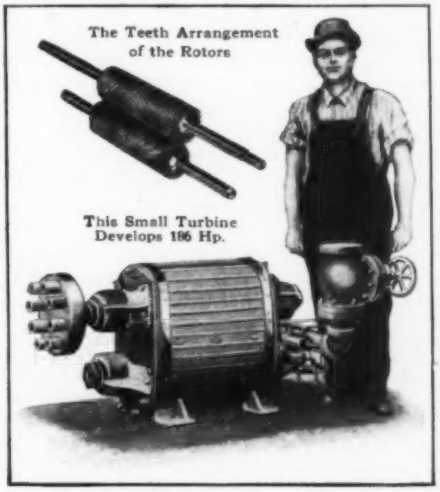
The most useful automobile in Washington County, Maryland, is the one that serves as a circulating library for the remote cabin dwellers who are too hard-worked to seek literature themselves. The population of the county, outside of Hagerstown, is 30,000, spread over 500 square miles. For several years, Miss Mary L. Titcomb, of Hagerstown, who conceived the idea, carried literature to the out-of-the-way places in a sort of cupboard

The Automobile Library That has Taught a County to Read

on wheels, drawn by a horse. But this outfit was small, and the horse got tired on the steep roads. So, when a train ran over the wagon and left nothing but splinters, an automobile, provided with a special library body, took its place, and books are now taken to the doors of the readers by 24 routes, covering the whole county. About 2,800 volumes were circulated from door to door during the last six months of 1912.

COMBINED IMPULSE AND REACTION TURBINE

A new type of combined impulse and reaction steam turbine is said to give a steam economy from 20 to 50 per cent better than the best of existing standards. The construction of this new turbine is simple, consisting essentially of a case, two heads with bearings, and two rotors. These rotors are herringbone gears, cut by special machinery, without any loose or inserted blades. The steam acts within the pockets formed by these spiral gear teeth, making full use of the impact due to velocity, and avoiding all leakage. A film or cushion of steam is at all times maintained between the teeth of the rotors, the result being an elastic contact which produces smoothness of running.



AN ARTISTIC FLAGPOLE FOR A LAWN

A substantial and particularly graceful flagpole for a lawn is in the yard of a Chicago residence. The upper half of the pole is round, with the exception of two or three feet at the lower part, which is square. To the sides of this square were bolted four strips of clear material 2 in. wide and 1 in. thick, the strips being spread apart and held by cross-pieces. The pole was erected by bolting the lower ends of these strips to stakes driven into the ground.

LOW RATES FOR ELECTRIC COOKING CURRENT

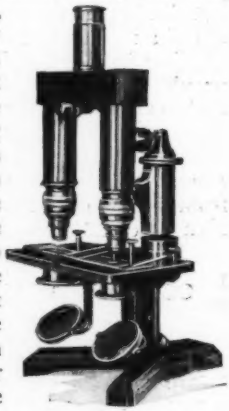
Although the average charge for electric current used for illumination in the different cities of the United States is about 10 cents per kilowatt-hour, the special rates for electricity used for cooking and heating differ widely. Boston, for instance, charges 10 cents per kilowatt-hour for the first 20 kilowatt-hours, and three cents for all over this. Redding, Cal., charges 3 to 1½ cents per kilowatt-hour, with a minimum charge of $1 per month; Salt Lake City charges 6.6 cents per kilowatt-hour, with a $2 minimum and a 10-per-cent discount, and Seattle charges 3 cents per kilowatt-hour, with a minimum of $2. In Omaha a discount of 5 per cent on all electricity used is made to customers who install equipment enabling them to use electricity exclusively for cooking, and the cooking rate is placed at 6 cents per kilowatt-hour.

AQUEDUCT CONSTRUCTION AS DEADLY AS WAR

Ten out of every 100 men working underground on the new New York aqueduct have been killed or injured every year since the work began. In the two years 1911 and 1912, 134 men were killed and more than 6,000 seriously injured. The New York Commissioner of Labor compares this record with the battle of San Juan, Cuba, in which the American forces lost only 142 killed, or only eight more than in this work of peace. The number of accidents in the aqueduct is nearly six times as great as the number of wounded in this battle and more than three times as many as there were men wounded in the American army during the entire Spanish-American war.

A DOUBLE MICROSCOPE WITH ONE EYEPIECE

A microscope that has two objectives for observing two distinct preparations at the same time, but only one eyepiece, has been recently constructed by a German scientist for the purpose of comparing certain objects that may be placed under the instrument. The microscope is so designed that the operator may, at will, also observe the preparation or object under one objective only by turning a small screw which temporarily cuts the other out of service. The instrument is used mainly for the examination of foodstuffs and comparing diseased and healthy tissues, but is equally valuable for industrial purposes, such as the comparison of textile products, paper, steel, and minerals.



Four Years at West Point

THE WORK AND PLAY OF THE CADET TOLD IN PICTURES

1—The Cadet's First Summer

PHOTOGRAPHS BY W. H. STOCKBRIDGE

The story of the life of a West Point cadet, from the day he reports for duty at the U. S. Military Academy until, four years later, he receives his commission as a second lieutenant and is welcomed into the army by the Secretary of War, is told so clearly in this remarkable series of 110 photographs that few words are necessary to explain the whole process of making army officers out of boys from every part of the United States.

Six hundred and fifty cadets are provided for by law. There are but 526 at West Point at present. All cadets are appointed by the President, but the law provides that one shall be chosen from each congressional district, one from each territory and the District of Columbia, one from Porto Rico, two from each state at large and 40 from the United States at large. Senators, representatives and delegates in congress submit to the President the names of the preferred candidates from their respective localities. Usually three names are submitted, a principal and two alternates. The custom is quite general among members of congress of holding competitive examinations open to all the boys in their districts and naming those who pass with the highest rating. All appointments must be made a year in advance of the date of admission, and on the last Tuesday in April the candidates are examined by boards of army officers, meeting at convenient places throughout the country. The examination must show proficiency in algebra, plane geometry, English grammar, composition and literature, geography and history. Candidates must be between 17 and 22 years old, at least 5 ft. 4 in. tall, and physically sound in every way.

Upon passing the examination, each cadet must sign an agreement to serve at least four years in the army after graduation, and subscribe to the oath of allegiance to the Nation. Then, on the morning of June 14, the newly made cadets report at West Point for duty.

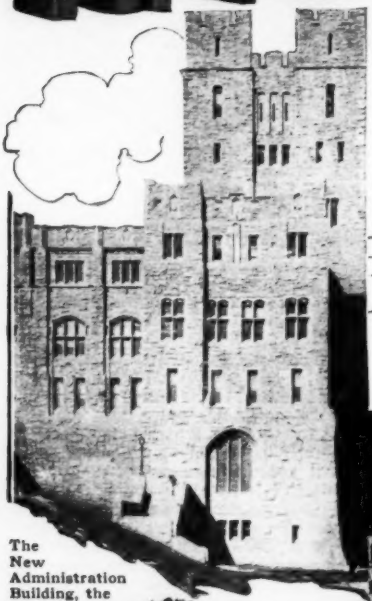
For most of them the view shown at the top of this page is the first glimpse of the historic and beautiful spot where they are to live and work—and sometimes play a little—for four years. West Point has been a military post continually since January 20, 1778, and was occupied as headquarters by General Washington during an important period of the War of the Revolution. The first military school was established by the Continental Congress on June 20, 1777, and in 1781, at the request of General Washington, the entire corps of instructors and students was marched from Philadelphia to West Point, where an engineer school, a laboratory, and a library had already been established in separate buildings. General Washington's interest in the Military Academy continued until his death, and during his presidency the rank of "cadet" was created and the school at West Point established on a permanent footing.

The pay of the cadet as an officer of the army, $600 a year, begins with his admission to the academy. He is also allowed one ration a day or its commutation in money, amounting to 30 cents, which brings his annual income up to $709.50. His necessary traveling expenses from his home to West Point are paid by the government, but he is required to spend $160 for his uniform and equipment immediately upon entering, of which at least $100 must have been deposited with the treasurer of the academy before he is admitted. Money may be spent by cadets only for purposes prescribed by the academy authorities, and they are not allowed to receive money or other supplies from home.

The pictures on the following pages illustrate the first summer of cadet life. As soon as he has acquired a uniform and the rudiments of drill tactics, the "plebe," as the new cadets are called in West Point slang, is sent into camp with the rest of the corps, and lives under canvas or in the open until the end of August.

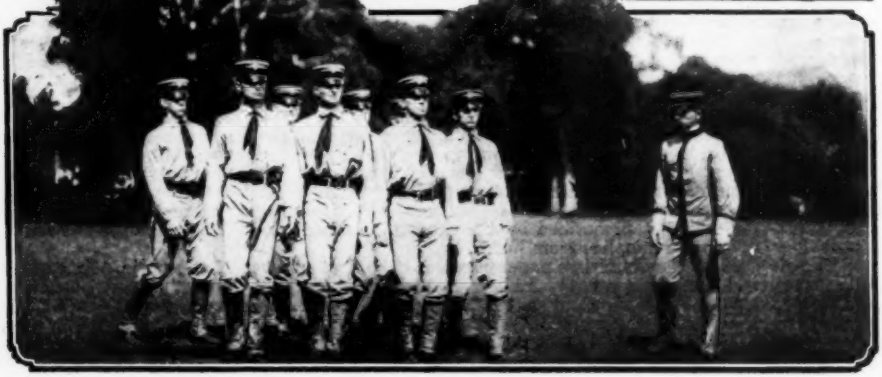
Next month's pictures will show the cadet's life to the end of his first year.

New Cadets, Just Arrived at West Point, Receiving Instruction from Older Cadets in the Proper Form of Salute

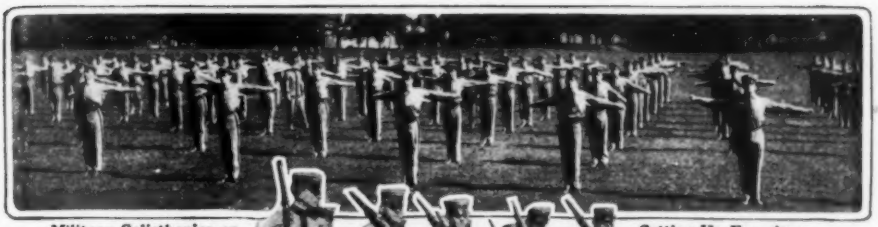


The New Administration Building, the First Place Which the New Cadet Officially Visits

South Cadet Barracks on Right

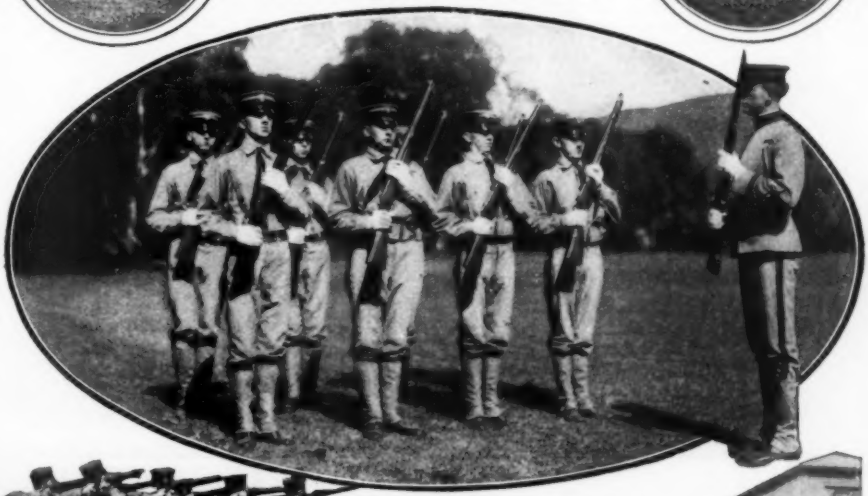


With Uniforms On for the First Time, Learning to March



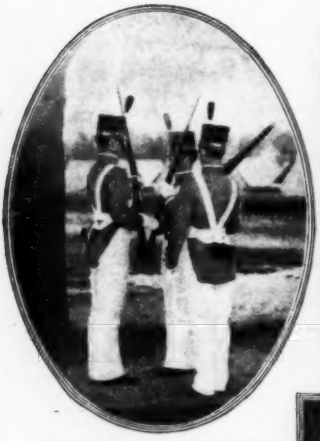
Military Calisthenics or Setting-Up Exercises

Daily Drills Occupy the First Four Weeks



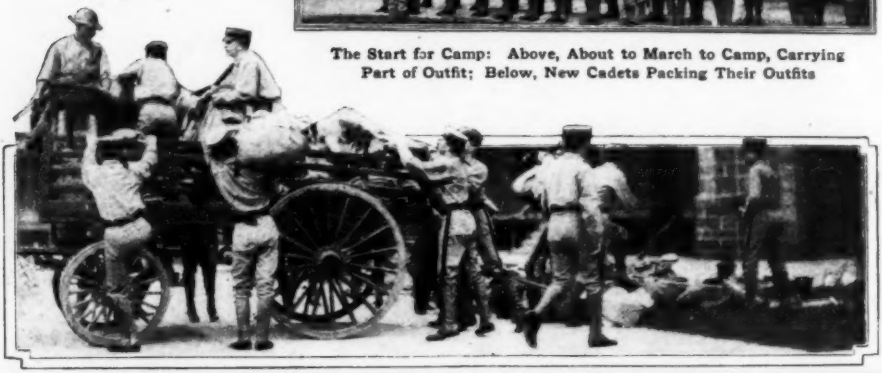
Infantry Drill, under Older Cadets as Instructors, Beginning with the Manual of Arms, Is the First Military Training of the New Cadet

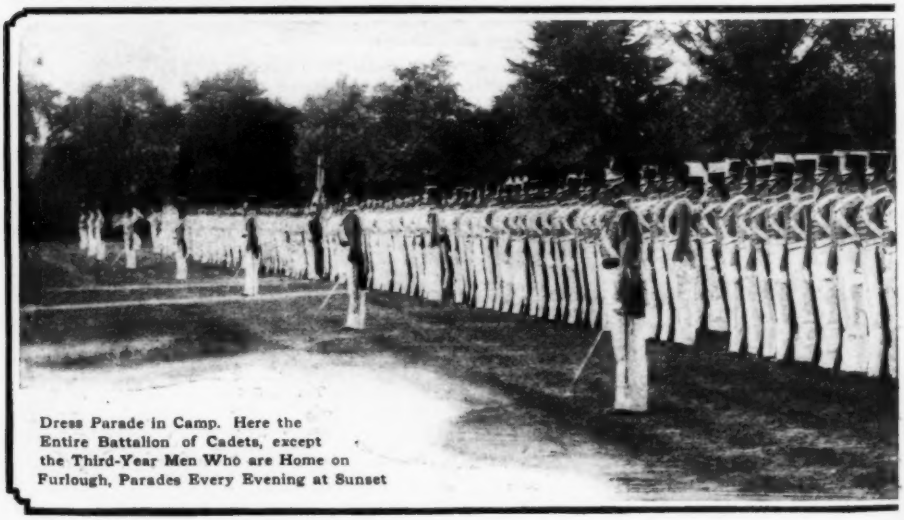
Final Stage of the Preliminary Squad Drill. The New Cadets are Now Ready to Join the Battalion in Camp



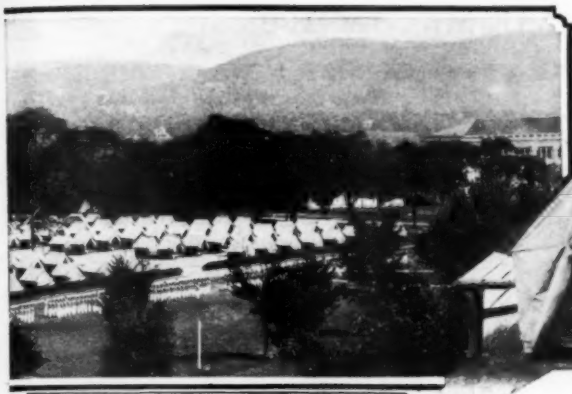
Posting Sentinels in Camp. A Guard is Maintained around Camp at All Times

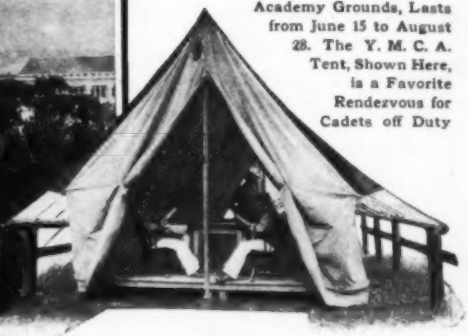
The Start for Camp: Above, About to March to Camp, Carrying Part of Outfit; Below, New Cadets Packing Their Outfits





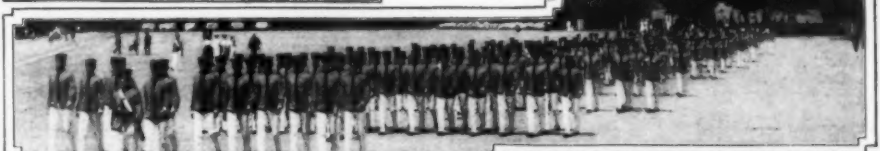
Dress Parade in Camp. Here the Entire Battalion of Cadets, except the Third-Year Men Who are Home on Furlough, Parades Every Evening at Sunset



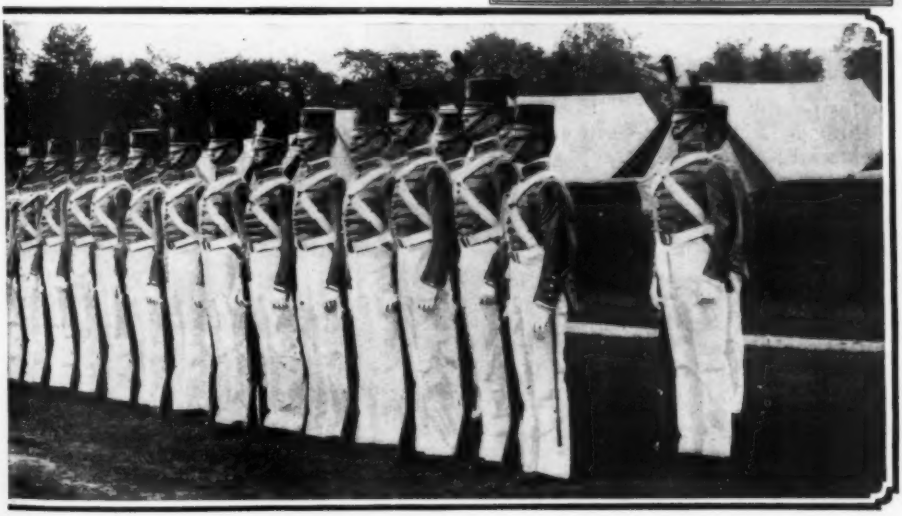


Cadet Camp, on the Military Academy Grounds, Lasts from June 15 to August 28. The Y. M. C. A. Tent, Shown Here, is a Favorite Rendezvous for Cadets off Duty

On the Left, the Mess Hall; Below, Cadets Marching from Camp to Dinner, and Scene in the Mess Hall



The New Cadet's First Summer at West Point is Over. He has Had a Taste of Military Life and Is in Fine Trim to Take Up Classroom Work in September



THE MEMORIAL TO AIRMAN CHAVEZ

On the spot at Domodossola, Italy, where George Chavez, the first airman

The Chavez Monument at Domodossola, Italy

to fly over the Alps, fell to death in making a landing, has been erected a memorial shaft. It is a simple, rough-surfaced column.

Owing to the requirements of the Post Office department, which distributes magazines by freight, this issue of Popular Mechanics Magazine, in order to reach subscribers and newsdealers by April 20, has to go to press on March 27, nearly a month in advance of publication, and too early to include photographs of such national catastrophes as the Omaha tornado and the floods in Ohio and Indiana.

"LEPROSY NOW CURABLE," A MISTAKE

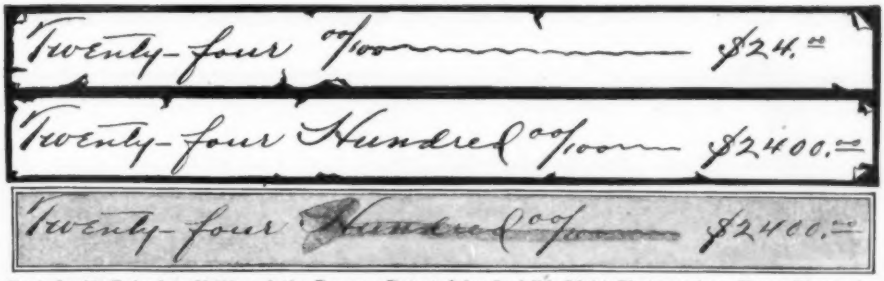
In a recent issue of this magazine an article was printed entitled "Leprosy Now Curable." It recounted the alleged use of a carbonic-acid pencil by Dr. J. Williams Lord of Baltimore. The article was prepared by a writer understood to be a graduate physician versed in the special medical subjects which he frequently contributed to newspapers and magazines. Doctor Lord informs us the statement is without foundation, and did not receive his sanction, as he had done no work with the carbonic-acid pencil in the treatment of leprosy.

INVISIBLE LIGHT USED TO DETECT FORGERIES

By the use of a lens made of quartz covered with a thin film of metallic silver, Prof. R. W. Wood of Johns Hopkins University has developed a practical means of making photographs by the invisible rays of light above the spectrum, known as ultra-violet rays. The quartz lens is necessary because these rays will not pass through ordinary glass, while the silver film acts as a screen to shut out all the visible rays and those below the spectrum, admitting only the ultra-violet light.

Most white objects appear black when photographed by this invisible light. By its use, also, perfectly transparent objects, like glass, may be photographed in black. Photographs of the planets made with this apparatus have been of service in determining the nature of the material and elements of which the stellar bodies are composed. Professor Wood's own photographs of the moon showed conclusively the presence of sulphur in one of the so-called craters on the moon's surface, thus furnishing a further indication that these craters are of volcanic origin.

A practical use of photography by invisible light is its application to the detection of forgeries. Chemical means



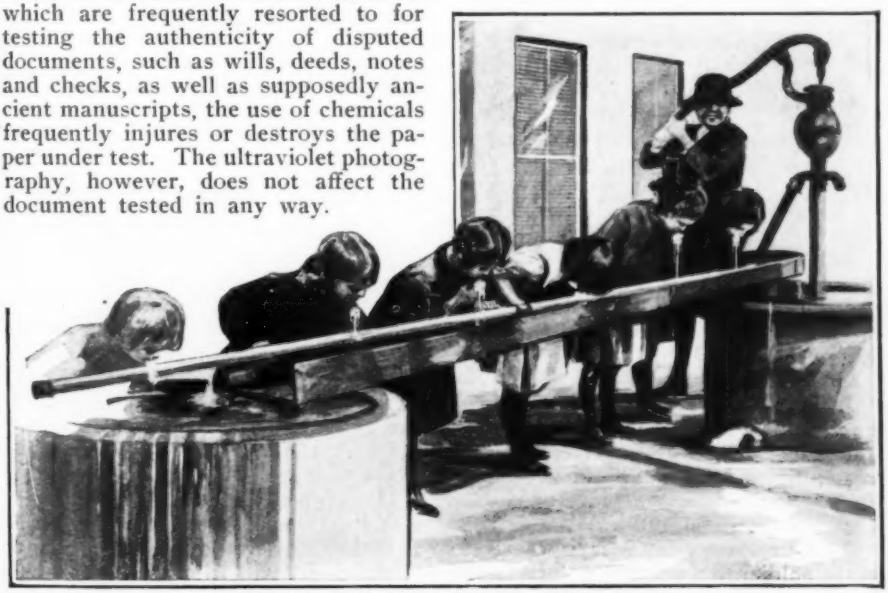
Check for $24 Raised to $2,400 and the Forgery Detected by Invisible-Light Photography. Upper Illustration Shows Original Appearance of Check; Middle Picture, How It Looked When "Raised," and the Lower, a Photograph Made with Ultraviolet Rays, Showing the Word "Hundred" was Written over an Erasure

used by forgers in altering checks and documents have been perfected to the point where it is often impossible to detect the erasures by the use of a microscope. A check originally written for $24 was raised by a clever forger to $2,400 and passed the cashier of one of the largest banks in Baltimore without detection. A photograph made by Professor Wood with the ultraviolet rays showed clearly a smudge where a heavy line had been erased and the word "hundred" written in after the "twenty-four," thus proving the check to be a forgery.

While there are chemical methods which are frequently resorted to for testing the authenticity of disputed documents, such as wills, deeds, notes and checks, as well as supposedly ancient manuscripts, the use of chemicals frequently injures or destroys the paper under test. The ultraviolet photography, however, does not affect the document tested in any way.

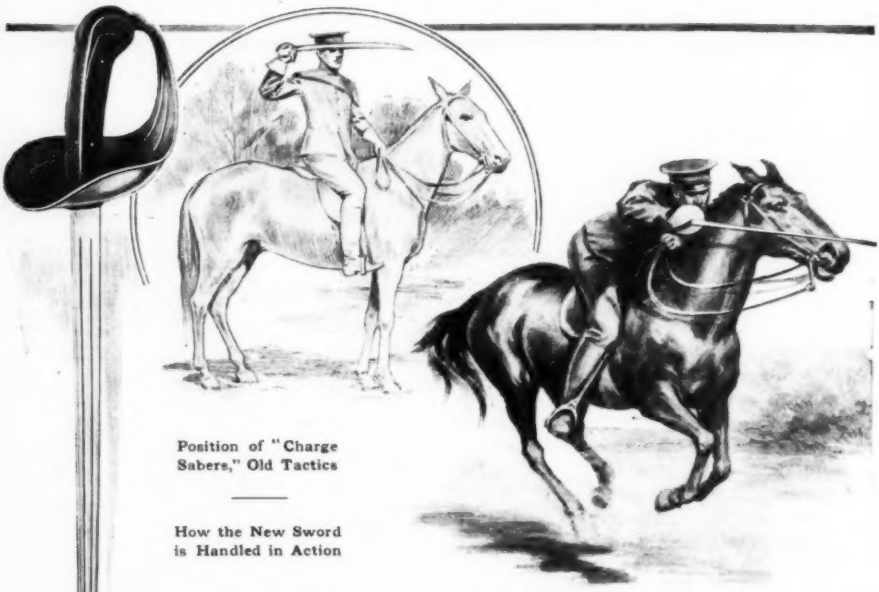
A SANITARY FOUNTAIN THAT IS EASILY CONSTRUCTED

Any public school with a good well and pump may have a sanitary drinking fountain at small cost, by boring holes about 10 in. apart in a piece of 2-in. pipe, one end of which is plugged so the water will run out only through the holes, the other end being attached to the spout of the pump. A fountain of this sort is in use at a school in Gibsland, La. Any desired length of pipe may be used; the fountain is absolutely sanitary and can be operated by anyone who can work the pump handle.



The Hand Pump Turned into a Sanitary Drinking Fountain

NEW U. S. CAVALRY SWORD HAS THRUSTING POINT



Position of "Charge Sabers," Old Tactics

How the New Sword is Handled in Action

The new sword just adopted by the U. S. Army authorities for cavalry use is strikingly different in almost every detail from the old saber. The blade is 35⅞ in. long, perfectly straight, sharp on both sides, and tapers to a sharp point. The guard is strongly constructed and affords complete protection to the hand. The sword itself weighs a trifle more than the old saber, but the combined weight of sword and scabbard is about 2 oz. less than the old equipment. The service scabbard for the new sword is of wood covered with rawhide and canvas. Officers' service scabbards are of dull-finished steel, while they will wear blue-steel scabbards on garrison duty.

The new sword makes it easier to train soldiers to use the point instead of the cutting edge. Cavalry experience has demonstrated that the sword is much more effective for thrusting than for slashing, although the tendency of the beginner with the saber is to swing it as though it were an ax or a club. A cutting blow, even with a sharp sword, seldom dismounts or disables an opponent, while the forward thrust with the point, even with comparatively little force behind it, usually disables or kills if it reaches its mark.

The new cavalry tactics adopted for the use of the new sword give the cavalryman a much more effective position for the charge. Instead of sitting upright in the saddle and exposing the body to the enemy, the new position projects the sword beyond the horse's nose, while the soldier is protected by the animal's head and neck.

¶The highest flight ever made by an airman was accomplished on March 11, 1913, by M. Perreyon, who reached an altitude of 19,684 ft. in a Bleriot monoplane at Buc, France.

ELECTRICAL PROPULSION FOR NAVY COLLIER

The first electrically driven ship in the U. S. Navy will be the collier "Jupiter," which is being equipped with electric motors for turning its propeller shafts. Experiments with electric propulsion have been made in Europe on small merchant vessels with excellent results. The fuel economy of the turbine engine at high speeds is generally admitted. The interposing of a dynamo and motor between the turbine and the propeller shaft, however, not only makes it possible to maintain the speed of the engine at its most efficient point, at whatever speed the propeller may be driven, but permits of more rapid and certain control of the ship's speed, as well as allowing the use of a steam turbine of less bulk and simpler construction than those in general use on shipboard. The "Jupiter" is to be fitted with a single electric generator and separate motors for its two propeller shafts.

USING LIME TO THAW THE GROUND

Unslaked lime has been used successfully for thawing frozen earth in West Liberty, Iowa. Sewer trenches were being dug during the winter months. The ground froze to a depth of 4 ft. and resisted all efforts of the trenching machine to break it. Finally quicklime was broken up into small pieces, spread the width of the trench to be opened, and covered with straw, hay or manure. Water was then poured upon it, the covering retained the heat, and this, with the hot water, penetrated the frozen ground sufficiently to enable the trenching machine to make headway.

MAN-CARRYING ROCKET FAILED TO GO UP

In an attempt to emulate the thrilling flight of Jules Verne's hero, who made an imaginary trip from the earth to the moon, a man in New York recently tried to go up in the air on the top of a huge skyrocket loaded with 1,500 lb. of black powder, and descend by means of a parachute, but the rocket failed to leave the ground. The moving-picture men were on hand; an interested crowd was assembled at a safe distance and everything ready for the flight when the rocket exploded with terrific force and threw the would-be hero a distance of about 30 ft., burning and injuring him very severely.

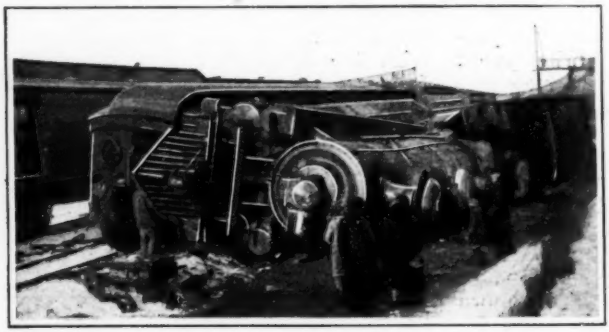
Photos by Underwood & Underwood

What Happened When the Fuse was Lighted

Preparing to Ascend in a Huge Skyrocket

A REMARKABLE RAILROAD WRECK

The amazing feature about this railroad wreck, which recently occurred seven miles west of Columbus, Wis., on the C. M. & St. P. railroad, is that the train, while running at the speed of a mile a minute, suddenly left the rails while rounding a curve and failed to injure anyone except the fireman and engineer, although 160 passengers were aboard when the accident occurred. The fireman was bruised and the engineer suffered a broken leg.



Mile-a-Minute Train Wreck That Injured Only Two Persons

PIECE OF ROPE WRECKS "LUSITANIA'S" TURBINES

More than one million blades of the "Lusitania's" turbines were twisted out of pitch and will have to be replaced, at a cost of several hundred thousand dollars, through a trivial accident which recently befell the great vessel. A small piece of rope fell into the hydraulically controlled steering mechanism, causing the steering gear to jam. The order was given to reverse at full speed, but the strain proved too severe for the blades of the turbines.

¶A new long-distance record for oversea flying was made recently by a French aviator, who covered a distance of about 160 miles over the Mediterranean Sea from Tunis, Africa, to Sicily.

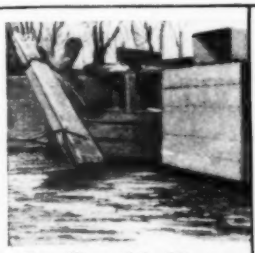
NEW UNDERFEED FURNACE DISCHARGES ASHES

A new self-dumping underfeed stoker has moving fuel-bearing grates extending across the entire width of the furnace, which carry the fuel down an incline of 20 deg. The coal is distributed evenly through the combined action of a plunger in the retort and the moving grates, allowing a more uniform passage of air than is possible when the coal is in heaps. The discharge of refuse is continuous through the employment of pushers which force the ashes toward an apron. This discharge can be regulated so that the fuel will be entirely burned out. Clinkers are also broken up by the motion.

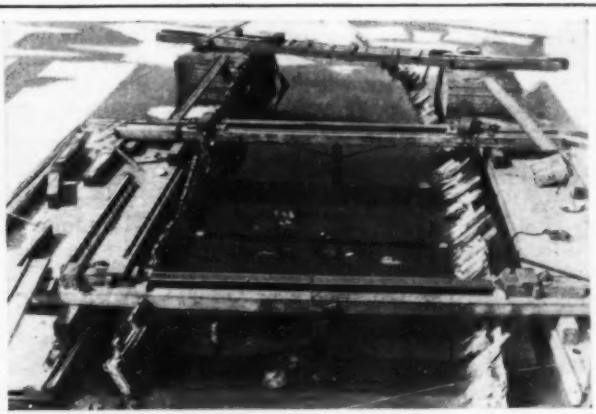
FIRST AUSTRALIAN STAMP HAS KANGAROO EMBLEM

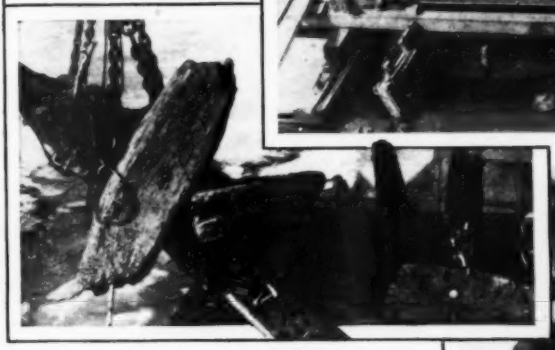
The kangaroo has been officially accepted as the emblem of the Australian Federation, which has just issued its first postage stamps. These stamps bear a picture of a kangaroo on a white background, the outlines of which take the form of the coast line of the Australian continent. Heretofore each of the states in Australia has issued its own postage stamps. With the establishment of the new federal city of Canberra, the building of which in the wilderness from the plans of an American architect has begun, Australia is becoming nationalized.

PERRY'S FLAGSHIP RAISED AFTER MANY YEARS

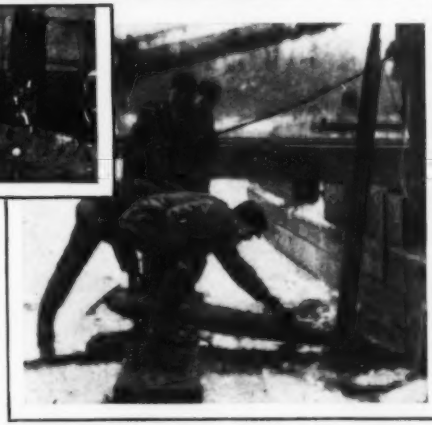


Bow View of the Wreck





Stern View, Showing Waterlogged Timbers



Above: Hull of Commodore Perry's Flagship "Niagara" being Raised from the Bottom of Erie Harbor

Below: Workmen on the Ice Placing Timbers for Raising the Historic "Niagara"

The wreck of the brig "Niagara," Commodore Oliver Hazard Perry's flagship, in the naval battle of Lake Erie, fought off Put-in-Bay on September 10, 1813, was raised on March 6, 1913, from the bottom of Misery Bay, in the harbor of Erie, Pa., and is being restored to its original form for exhibition in connection with the centennial celebration of Perry's victory over the British fleet on the Great Lakes.

The "Niagara" was one of two 20-gun ships, the largest vessels in Commodore Perry's fleet of nine. The "Lawrence," his first flagship, was so shattered in battle that the commander transferred his flag to the "Niagara." This incident is the subject of a famous historical painting which hangs in the Capitol at Washington and represents Commodore Perry being rowed in a small boat from one ship to the other under the fire of the British guns. It was at the close of this decisive battle of the War of 1812 that he sent his famous message to Gen. William Henry Harrison:

"We have met the enemy and they are ours."

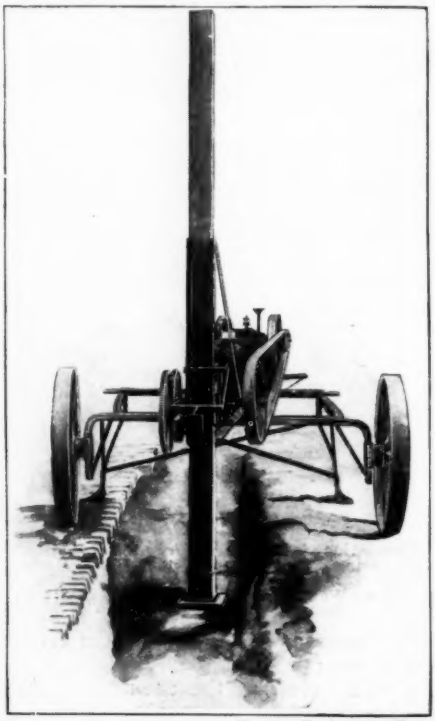
The "Niagara," like the rest of Perry's fleet, was built at what is now Erie, then called Presque Isle. Noah Brown, a shipwright, and fifty carpenters were brought from Philadelphia and hastily constructed a squadron to attack the British fleet on Lake Erie. Shipbuilders who examined the "Niagara" after it was raised, say that the wreck shows evidence of hasty con-

struction with whatever kind of wood or material happened to be at hand.

The historic old vessel was raised by chains attached to pontoons. The chains were passed under the wreck by means of an air hose which was used first to pump away the sand that covered the wreck and then to form channels under the keel. Several months of preliminary work was necessary before the chains were in place. Then a heavy floating crane was used for hoisting and the "Niagara," lashed between pontoons, was towed to shore.

TAMPING MACHINE FOR REFILLING TRENCHES

This machine tamps the dirt in such an effective manner, as the latter is thrown back into the ditch from which



Courtesy Engineering News
Power Tamping Machine for Trench and Surface Work

it was taken, that there will be no settlement whatever of the paving when relaid over the trench. The apparatus is operated by its own gasoline engine; enables all the earth taken out to be put back in a fraction of the time necessary where manual labor is employed, and requires the attendance of only one man, except on wide ditches and surfaces where the footing is not good. The tamper is adapted for trenches of various widths and depths.

ELECTRIC STEERING GEAR ON U. S. BATTLESHIP

The U. S. battleship "Mississippi" has been recently equipped with electric steering gear in place of the steam engine which formerly operated the rudder. The motor is geared to a right-and-left screw shaft on which move traveling nuts which, supported by guides and by means of connecting rods, rotate the yoke on the rudder stock. The motor is started and stopped whenever the rudder is moved. It is automatically accelerated in starting by a panel board installed near the motor, which in turn is controlled from any one of four steering stands in different parts of the ship. In stopping, the motor is promptly brought to rest by dynamic braking assisted by a magnetic disk brake which securely locks the motor when at rest. Limit switches are provided for automatically stopping the motor before the rudder reaches a "jammed" position in either direction, and the motor may be reversed from the steering stand when so stopped. The steering stands consist, each, of a single-pole, double-throw master switch which controls the flow of current through the solenoids of the main contactor switches on the control panel.

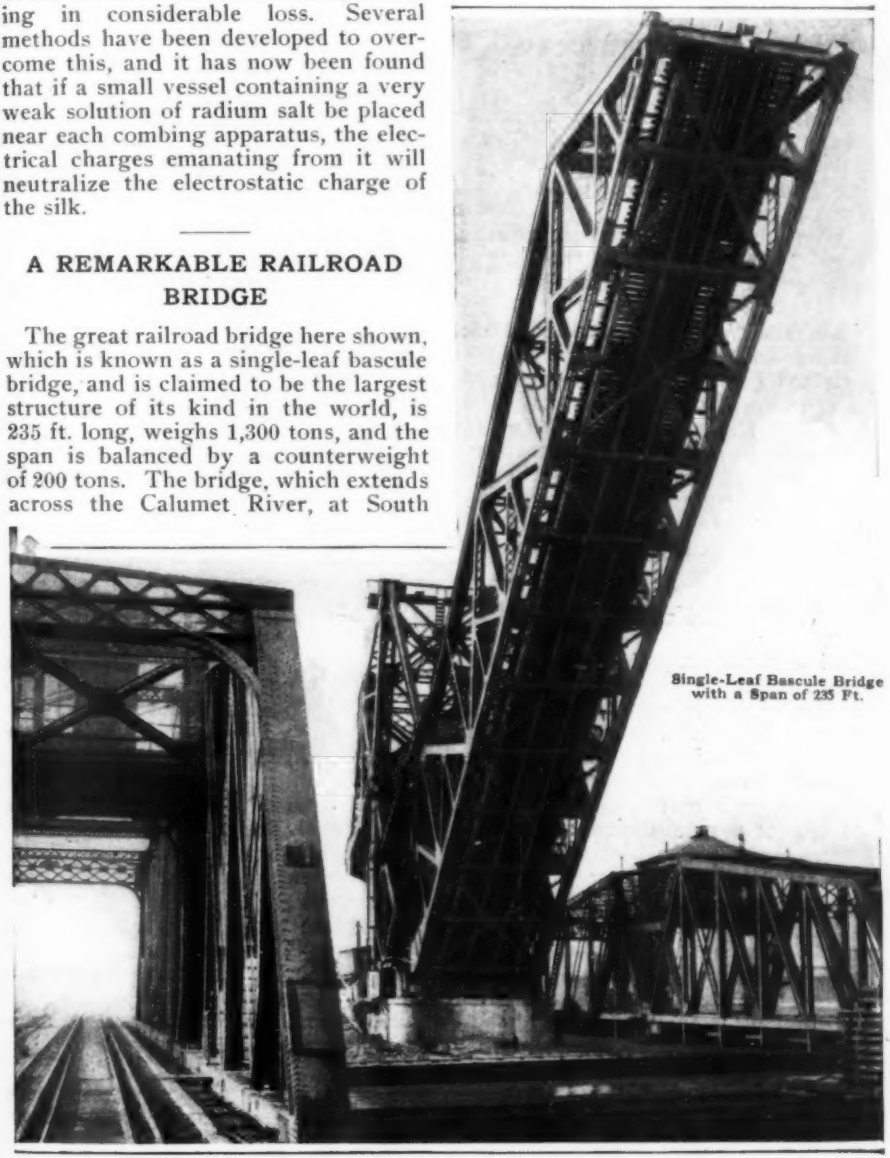
¶The sum of $208,878—an average of more than $6,900 a day—was distributed in benefits to the members of the Employes' Relief Funds of the Pennsylvania Railroad System during a single month.

RADIUM FOUND USEFUL IN SILK-THREAD PROCESS

When silk is combed before being spun into thread it becomes charged with electricity, which causes the ends of the fibers to extend outward, resulting in considerable loss. Several methods have been developed to overcome this, and it has now been found that if a small vessel containing a very weak solution of radium salt be placed near each combing apparatus, the electrical charges emanating from it will neutralize the electrostatic charge of the silk.

A REMARKABLE RAILROAD BRIDGE

The great railroad bridge here shown, which is known as a single-leaf bascule bridge, and is claimed to be the largest structure of its kind in the world, is 235 ft. long, weighs 1,300 tons, and the span is balanced by a counterweight of 200 tons. The bridge, which extends across the Calumet River, at South Chicago, is raised or lowered in the remarkably short period of 1¼ minutes, the control being effected from the operator's cabin in precisely the same manner as a street car is handled by the motorman.



Single-Leaf Bascule Bridge with a Span of 235 Ft.

IS FIVE YEARS A FAIR TEST? A REPLY TO "WHAT GOOD IS IT?"

The article "What Good Is It?" in the March issue of Popular Mechanics Magazine, has evoked many replies from airmen and others who do not agree with "Licensed Airman," who wrote it. The following, by Mr. O. E. Williams of Scranton, Pa., presents the other side of the argument:

After sixty centuries of travel by land, we have the high-powered automobile and the fast express. And yet the Twentieth Century Limited was wrecked.

After nearly as many centuries of travel by water, we have the "Imperator" and the superdreadnoughts. And yet the "Titanic" sank.

Still the "immortal skeptic" thinks that means of travel by air should be perfected in five years. He acknowledges motors have been improved, but underestimates the value of this. He acknowledges men are doing in aeroplanes today things that were thought impossible four years ago, but undervalues the importance of this. He speaks of one faulty bolt or wire causing wreckage, but forgets that the same is true of any fast-moving vehicle. Scientists are discovering hitherto unacknowledged aerial laws and applying them to aeroplanes to produce inherent stability, and aviation is on the eve of becoming at least as safe as any other means of swift locomotion.

No amount of knocking on the part of the "immortal skeptic," and others of his ilk, can stem the tide of progress. We have put our hands to the plow and will not look back.

Every one acknowledges that walking is the safest mode of travel, and yet, at that, men die of heart failure. It is not the length of a man's life that counts. It is what he has accomplished.

We live in deeds, not years;
In thoughts, not breaths;
In feelings, not in figures on a dial.
We should count time by heart throbs;
He most lives who thinks most,
Feels the noblest, acts the best.

SHIP DESTROYED BY DYNAMITE EXPLOSION

A loading hook, jabbed by a careless stevedore into a box of dynamite, was the cause of an explosion that destroyed the British steamship "Alum Chine," which was loading dynamite for the Panama Canal, in the harbor at Baltimore on March 7, this year. About 300 tons of dynamite exploded, killing 30 men, several of whom were on the U. S. collier "Jason," a mile and a half distant; blowing the "Alum Chine" to atoms; riddling the "Jason" with fragments of iron and steel; sinking the seagoing tug "Atlantic," which stood by for rescue; creating a huge wave which tore shipping from moorings, and shattering windows for several miles around. The explosion was felt more than 100 miles away.

Testimony at the official investigation of the disaster revealed that the first slight explosion started a fire, which in time caused the entire cargo to explode. Several minutes elapsed between the two explosions, which gave most of the men on the ship an opportunity to escape. The one whose carelessness caused the catastrophe was only slightly hurt.

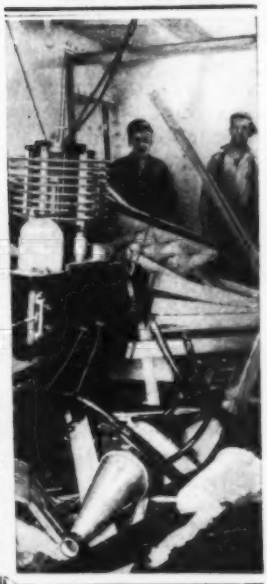
The illustration showing the column of smoke that rose after the explosion was made by a photographer who happened to be on the bay in a launch with his camera ready for work, the shutter being set for an exposure of the 270th part of a second. The picture was taken from a point about two miles distant from the "Alum Chine."

¶The Bureau of Commerce estimates that there are at least 200,000 motorboats in the United States.

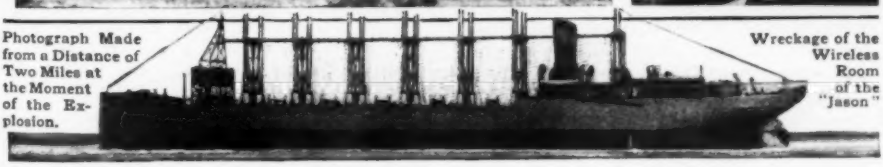
The "Alum Chine," Blown to Atoms by the Explosion of 300 Tons of Dynamite

Photograph Made from a Distance of Two Miles at the Moment of the Explosion.

Wreckage on the Starboard Side of the Collier



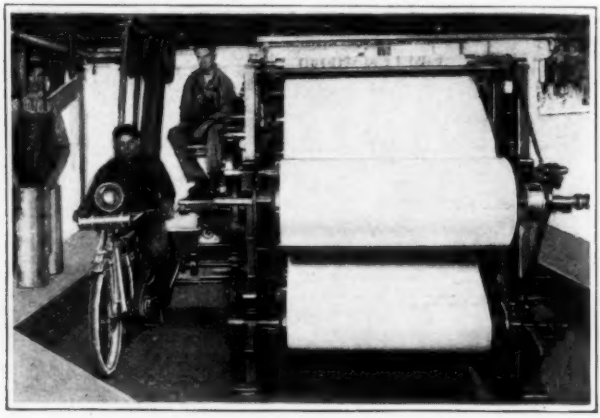
Wreckage of the Wireless Room of the "Jason"



U. S. Collier "Jason, "Riddled by Fragments of Iron and Steel from "Alum Chine"

USES MOTORCYCLE TO DRIVE NEWSPAPER PRESS

A motorcycle played an important part in furnishing power for the printing of a newspaper in Elgin, Ill., when a sleet storm threw the electric-power service of that city out of commission. The motorcycle was first harnessed up to a trimmer, shaver and router for the finishing of the plates. Then the motorcycle, along with a small portable gas engine, was belted to the shaft of the big press. The combined power grunted and chug-chugged, giving off much smoke, but turned out 100 eight-page papers per minute, which was about half the speed the press usually makes.



Motorcycle Harnessed to Newspaper Press in Emergency

FIGURES REVEAL GREAT TELEPHONE TRAFFIC

There are 70,000 cities, towns, and villages of the United States within the telephone zone, while one company and its allied branches have established, altogether, 7,456,074 stations throughout the country. The daily average of telephone conversations last year is estimated at 26,310,000. The figures for 1911, the last available comparative tables, show that Europe has only two-fifths of the telephone traffic of the United States.

NEW KIND OF WATERPROOF PACKING MATERIAL

A new kind of packing material, which is made of paper, cloth and pitch or wax, in such a manner that it is more satisfactory than ordinary paper packing, especially for the protection of bottles containing liquids, and other breakable articles during transit, has been placed on the market. The new material is made in various thicknesses for different purposes; is claimed to be impervious to either gas or water, and has strength and pliability sufficient for all the purposes for which it is manufactured. The packing is made up in rolls and has the appearance of ordinary paper coated with a wax or pitch composition and a fabric like mosquito netting, the meshes of which vary according to the purpose for which the paper has been designed.

BREAD MORE DIGESTIBLE WHEN NOT KNEADED

A new way of making bread that can, it is claimed, be digested by the weakest stomach, has been discovered by a Philadelphia woman. The method consists in mixing the flour, water, yeast, etc., quickly, and with the least possible amount of stirring, and then setting it to rise. When raised, the dough is not kneaded, but quickly shaped into loaves, with as little handling as possible and then baked in the usual way. This bread is not quite so white as if prepared in the ordinary way, but, according to scientists, more than 90 per cent of it is easily digested.

¶The hydroelectric plant being installed on the Norefall, Norway, will develop 216,000 hp. and will be one of the largest in the world.

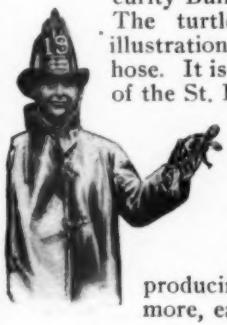
A Texas Irrigation Well Yielding 2,000 Gallons per Minute

A POWERFUL TEXAS IRRIGATION WELL

The plains in the vicinity of Midland, Tex., are being turned into richly productive fields by irrigation, the water being obtained from wells varying in depth from 120 to 250 ft. The pump here shown has a capacity of 2,000 gal. per minute. The well is 120 ft. deep.

TURTLE FOUND IN FIRE HOSE

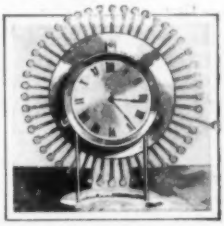
An unusual incident is recorded in connection with the burning of the Security Building, in St. Louis. The turtle shown in the illustration came through the hose. It is being kept by one of the St. Louis engine companies as a curiosity.



¶ There are 735 coal mines in the United States producing 200,000 tons, or more, each annually.

A CLOCK THAT MAKES YOU REMEMBER

A clock which prevents the forgetting of engagements as well as tells the time of day has been invented by a Californian. Surrounding the clock like the petals of a sunflower are a number of little knobs. If, for instance, the owner of the clock wishes to be reminded at 2:15 o'clock of an engagement or an errand, he places a tag on the proper knob and sets the mechanism. When the time arrives the mechanism automatically projects this knob above its fellows. An alarm may also be rung.

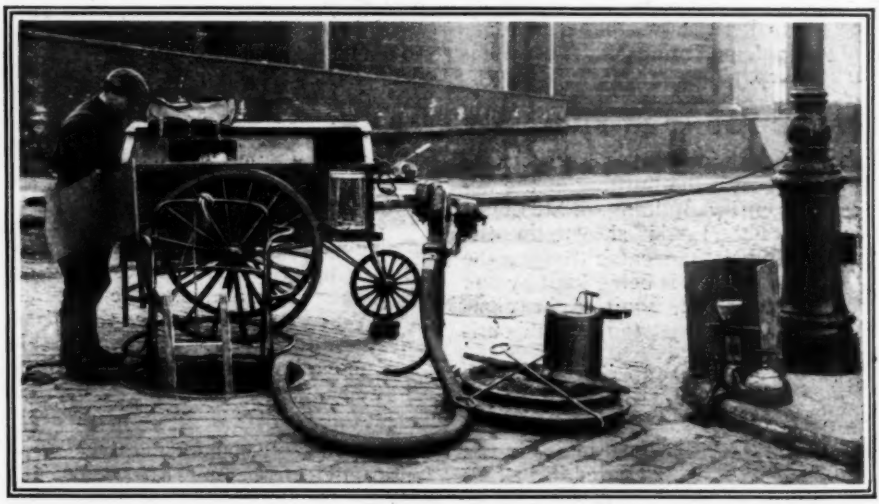


¶ More than 48,000 locomotives were found defective out of 74,000 inspected by the Interstate Commerce Commission's employes in 1912.

SAFETY PRECAUTIONS IN ELECTRICAL PLANTS

The system of accident prevention developed by the New York Edison Company to protect its workers from danger has been recognized by the American Museum of Safety, which recently awarded this company a medal offered by one of the large insurance companies. This electrical company's endeavor to safeguard the lives of its employes is said to be the most conspicuously successful of any in 1912.

In the illustrations are shown some of the safeguarding devices, which include wire cages and "extra danger" placards for high-voltage transformers, screened guard rails for flywheels, rubber gloves and wooden poles used for grounding and discharging work, and an electric pump for furnishing fresh air to workers in manholes. The operators are so hedged about by rules and regulations that even carelessness is practically eliminated. All the high-tension switches which control the generators are installed in separate compartments, and the operator has always before him a number which records the voltage. But before he starts work a considerable amount of formality has to be gone through. If, for instance, alterations are to be made in the connection or location of any of the high-tension apparatus, or additions connected up, a sketch must be furnished the system operator 24 hours, if possible, before the work is to begin. Then the foreman of the construction department or the employe delegated by him to perform the task has to ascertain from the regulator in charge of the switchboard that the particular cable, bus or switch is not connected with any source of high potential, and that it has been discharged to ground since last it carried high-tension current. Then the system regulator notifies the system operator that the construction department is ready to proceed with the work, the operator orders the regulator to block the switches and connect all conductors to ground and to each other by means of the grounding and short-circuiting devices provided for the purpose. This work is personally inspected by the foreman of the construction department, a "not clear" placard is placed on the apparatus, and the actual work commences.

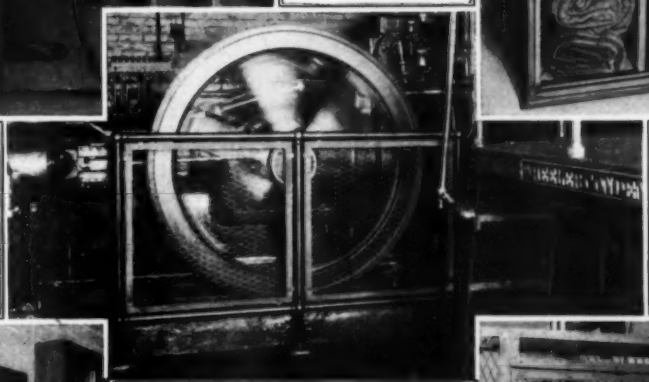


Electrically Operated, Portable Air Pump Furnishes Fresh Air to Workers in the Conduits

All Cables, Switches and the Like must be Discharged to Ground

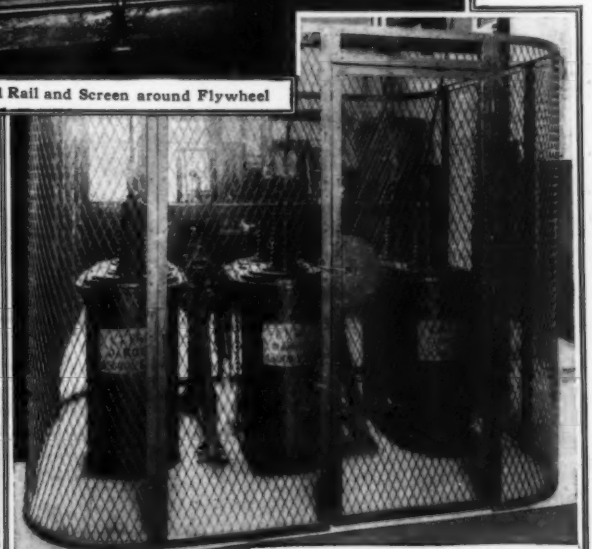
Face of the Medal

Medical Cabinet with All the Requirements for First-Aid Work



Guard Rail and Screen around Flywheel

Gloves and Poles for Grounding

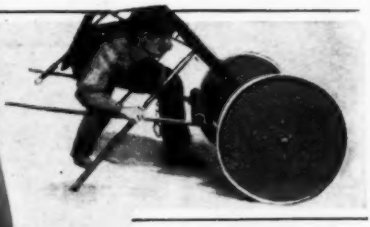


Wire Cages for the Transformers

PARIS POLICE USE HAND CANNON AND SHIELD

The Paris police department is now equipped with what is considered an effective weapon for use in dislodging automobile bandits or other criminals who barricade themselves in houses and defy capture, which is a habit the Paris "Apaches" have developed quite extensively in recent years. In two recent affairs of this kind the bandits kept the police off several days.

Ready to Discharge a Bomb Containing Suffocating Gases into a Robbers' Den



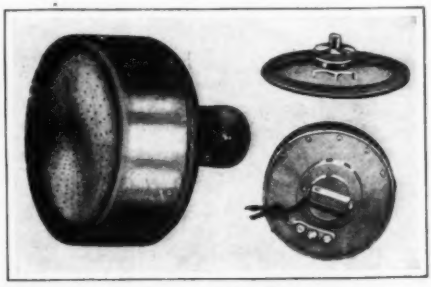
Advancing, behind the Wheeled Shield, against Barricaded Bandits

The weapon is a hand cannon, designed particularly for throwing bombs, which, when they explode, will fill a building or room with suffocating gases sufficiently powerful to overcome the occupants. The cannon looks like a piece of iron pipe, and may be carried in the hands or slung over the shoulder like a rifle. It can also be used as a fire extinguisher, for throwing life lines into the upper windows of burning buildings, forcing doors open by hurling heavy projectiles, and throwing grenades in war time. The diameter of the barrel varies with the purpose for which the cannon is to be used, and the bombs vary in size, according to their composition and purpose, from 11 to 20 lb. In loading, the bomb is inserted in the rear end of the barrel, a cartridge containing the projecting charge is placed behind it, and the breech block is screwed in. The pulling of a trigger explodes the charge in the cartridge and the bomb is thrown into the building, where it bursts, rendering everyone near it unconscious. As the range of the cannon is not great, a shield is provided for the protection of the operators when it is to be used in fighting barricaded bandits. The shield is made of chrome steel, folds in two places, and is provided with wheels.

When used as a fire extinguisher the bomb is filled with from 5½ to 6½ lb. of dry fire-extinguishing powder. For life-saving purposes a wooden projectile of sufficient weight is used, the line being attached to one end.

WATER-TIGHT TELEPHONE TRANSMITTER

A new telephone transmitter having several features of interest is here shown. In the first place, it is a transmitter of unusually high power, and secondly, it is claimed to be absolutely water-tight, which is important where instruments are exposed to the weather, as in mines, and like places. The sound-receiving diaphragm is pan-shaped in form, the vibrating surface



The Complete Transmitter, the Diaphragm Cell and a Rear View, Showing Terminals

being similar to that of a drum head. The material used is phosphor bronze, which is noncorrosive. The point of greatest vibration in a diaphragm is midway between the center and the edge, so, in this transmitter, advantage is taken of the fact by connecting the resistance cell to the diaphragm at this point. The result is a sensibility so increased that the usual funnel-shaped mouthpiece, which is necessary in the ordinary transmitter to intensify the sound waves, is eliminated, its place being taken by a flat, perforated, metallic guard.

CAPE COD OYSTERS ACT AS DRAG ON DREDGE

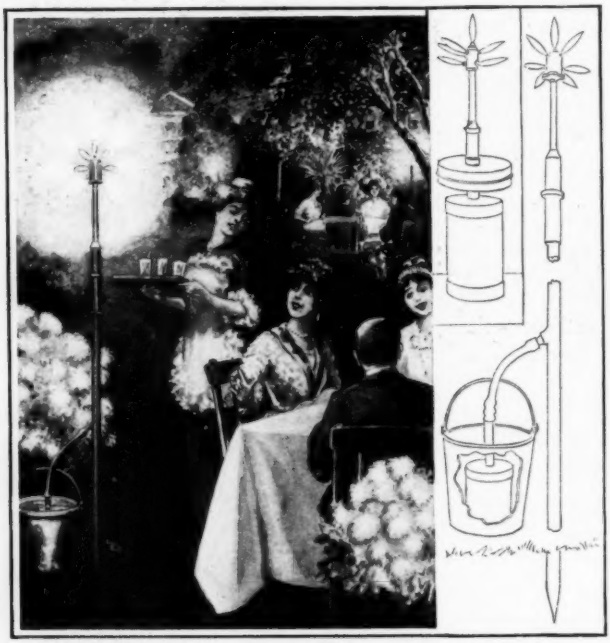
A huge mass of oysters and mussels became attached to the bottom of a large steam dredge in use in excavating for the Cape Cod Canal. When it was attempted to tow the dredge to the Delaware River for use on channel work and a powerful tugboat found it almost impossible to make headway with the dredge in tow, a superficial examination disclosed no reason for the unexpected drag. So the dredge was put into drydock at New York and several barrels of prime Cape Cod oysters were scraped from the hull.

FOUNTAIN MONUMENT TO ANIMALS' FRIEND

A 60-ft. monument having for its base a memorial drinking fountain was recently erected in Postoffice Square, Boston, for the use of horses and smaller animals. The fountain is provided with 16 individual drinking bowls which are used by more than 5,000 horses daily, and upon the top of the monument of granite and cement rests a brilliantly gilded eagle. The monument and fountain cost about $5,000 and a large portion of this sum was collected by school children to commemorate the life-work of the late George H. Angell of the Massachusetts Humane Society.

PORTABLE ACETYLENE LAMP-POSTS

By means of a new portable acetylene lamp-post, parks, squares or other open places may be vividly illuminated for special occasions, such as band concerts, and the like, the time taken for the erection or removal of the posts being negligible. All that is necessary is to force the pointed base of the pole into the ground, place a pail of water beside it, drop the acetylene box in the water, and make the required hose connection between the box and the piping in the post. By means of an ingenious mechanism contained in the acetylene box the amount of water entering to generate the gas is automatically regulated. Another type of this device has the pole supported by the water tank, for use in paved places.



Portable Acetylene Lighting Apparatus for Outdoor Gatherings

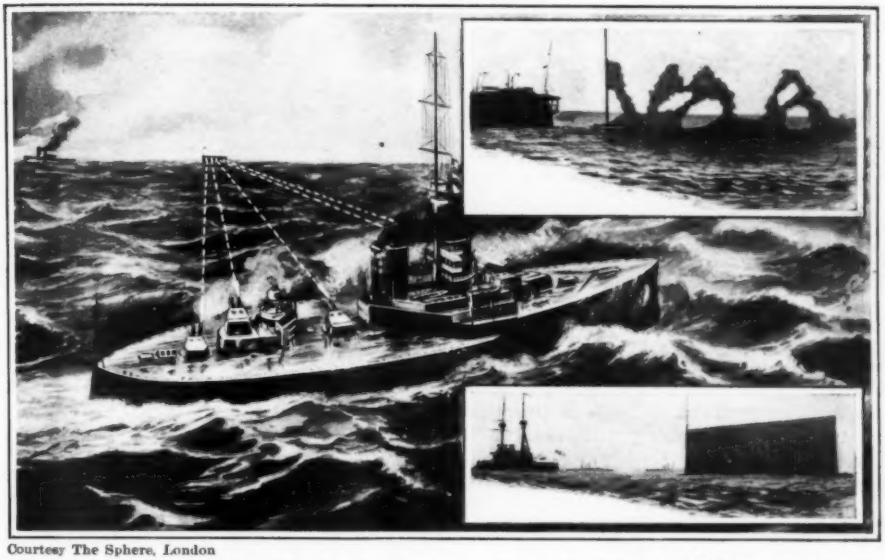
¶ Pipe-line transportation of coal mixed with water from the mines to Chicago is proposed.

ELECTRIC BLEACHER FOR SOILED CLOTHES

A machine that combines the principle of electric bleaching with the operation of washing clothes has been put on the market by an Ohio manufacturer of laundry machinery. A terminal electrode is placed on the inner side of each end of the outer receptacle of an ordinary steam washing machine and to these the service wires are attached. To the heads and partitions of the inner revolving cylinder, a circular electrode is attached, so arranged that some portion of each electrode will at all times be immersed in the washing fluid. Each inner electrode consists of two flat rings bolted together. They have no electrical connection other than through the washing fluid which is also the electrolyte. Therefore, one ring of each electrode acts as a cathode and the other as an anode. The electric current passing through the washing fluid from one end of the machine to the other sets up a chemical reaction which liberates bleaching gases. The device is said to be thoroughly practical, and inexpensive to operate.

VOLLEY FIRING OF BIG BATTLESHIP GUNS

Naval circles all over the world are following with great interest the remarkable tests in England of Sir Percy Scott's new system of firing the big guns of battleships in volleys. By this system the firing is controlled by a single officer stationed above the conning tower, and the number of guns to be fired, whether five or ten, are discharged simultaneously, the projec-



Courtesy The Sphere, London

The "Thunderer" Firing Five Guns Simultaneously in the Volley-Firing System, the Projectiles Flying over the Water Together

Above: The "Thunderer's" Target after Test
Below: Towing a Wooden Lattice Target Out for the Firing Test

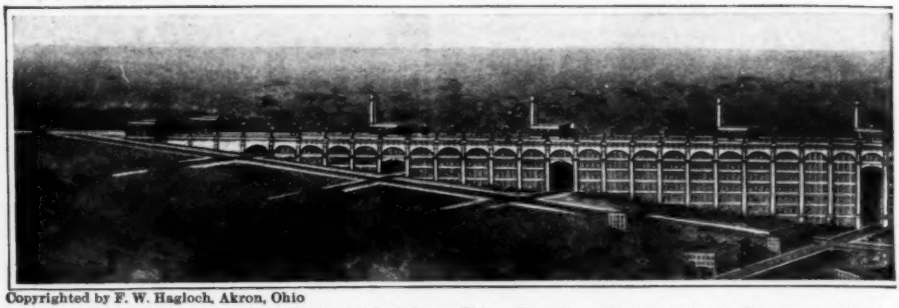
tiles leaving the ship's side together, flying over the water together, and striking one crashing, overwhelming blow. By this system there is, of course, the possibility of missing altogether, but in the tests, in which the "Thunderer" was equipped with the Scott control, the target, five miles distant, was torn to pieces by each five-gun volley discharged.

In the gun control at present in use on British battleships the guns are fired in a desultory manner, each individual turret officer determining the aim of his guns. During the tests on the "Thunderer," the "Orion," equipped with the ordinary gun-laying equipment, fired in the ordinary manner at targets to test the relative effectiveness of the two methods. The result leads British naval experts to believe that the Scott volley firing increases the efficiency 6 to 1, not only a greater number of shells reaching the target, but the damage being astounding. The fact that the guns are fired in volleys instead of singly also enables the smoke to clear away for the next volley.

BICYCLE WITH REINFORCED FRAME

A bicycle of standard construction, the frame of which is reinforced by steel tubing, as shown in the illustration, is on the market. It is claimed by the manufacturers that this type of bracing, which is brazed to the frame

Shock-Absorbing Bicycle Frame



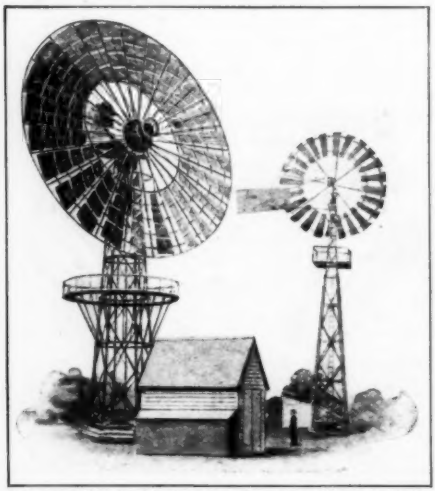
Copyrighted by F. W. Hagloch, Akron, Ohio

The Unique Industrial Bridge Projected for Akron, Ohio. The Space Underneath the Roadway will be

at six different points, enables the frame to withstand more severe shocks without being broken than is possible by using a reinforcing tube fastened in a position parallel with the horizontal or top part of the frame.

MOVABLE-VANE FORTY-FOOT WINDMILL

A windmill of rather unusual size, used by a railroad in India for pumping purposes, is here shown. The wheel, which is 40 ft. in diameter, is designed to move in a light wind of about 10 miles an hour. Due to the large area exposed to heavy winds, the vanes are so mounted that they may be turned partially or completely out of the wind when necessary.



A Large Windmill Used for Pumping Water in India

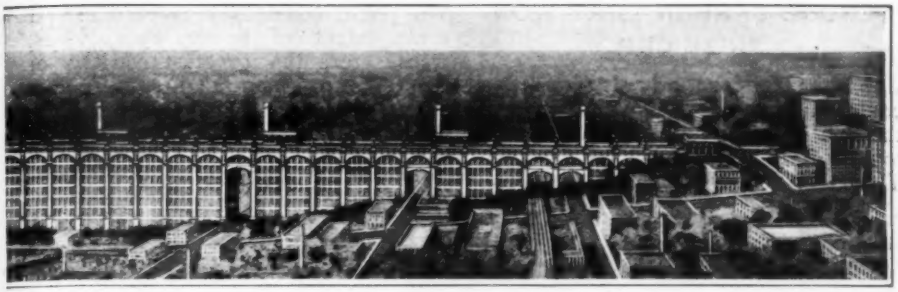
INDUSTRIAL BRIDGE FOR AKRON, OHIO

The business men of Akron, Ohio, are planning the construction of a remarkable reinforced-concrete, high-level viaduct. The plan, simply stated, is to erect a line of industrial buildings, 2,583 ft. long by 60 ft. wide, across the valley separating the heart of the city from the section known as North Hill and use the roof as a bridge. The total cost is estimated at $954,000, and the floor space available for rental would be about 873,000 sq. ft.

According to the plans, as at present drawn, there will be a sidewalk, 8 ft. wide, on one side of the bridge, and on the other side there will be seven freight elevators connecting the overhead roadway with the cross streets and with the factories. On the top story of the building, just under the roadway, will be a railway, enabling the occupants to load and unload goods under their own roof. The building will have its own power and heating plant, which will be sufficiently large to furnish heat and light for the entire downtown district.

It is believed that the considerable amount of convenient and economical floor space could be depended upon to persuade many new industries to locate in Akron.

¶Smothering fires in coal mines by forcing muck and water into the compartment in which the fire is burning is a plan being tried out by the United States Bureau of Mines.



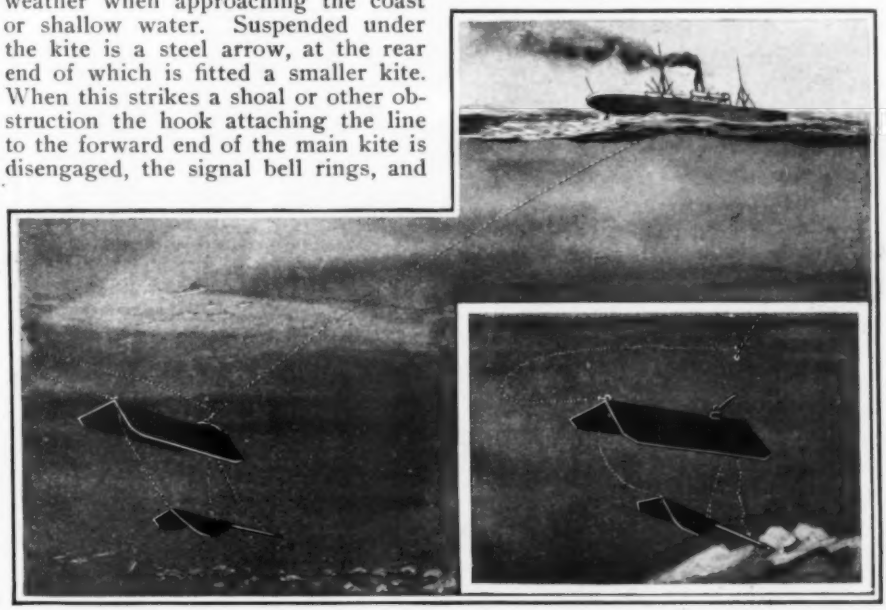
One Long Factory Building, Providing 873,000 Square Feet of Floor Space for Rental to New Manufactories

WATER-KITE LEAD SIGNALS SUBMARINE OBSTRUCTIONS

The Swedish submarine sounding device, known as a water kite, is said to be much more reliable than the ordinary sounding lead. Once sunk to a certain depth, indicated by the dial on its winding box, it keeps steadily at this depth regardless of the rate of speed of the ship, or of her yawings and turnings. It provides an uninterrupted sounding in unknown and dangerous waters, in foggy or misty weather when approaching the coast or shallow water. Suspended under the kite is a steel arrow, at the rear end of which is fitted a smaller kite. When this strikes a shoal or other obstruction the hook attaching the line to the forward end of the main kite is disengaged, the signal bell rings, and the kite mounts to the surface of the water.

For use as a shoal finder in submarine surveying, two of the kites are usually employed, lowered from two small boats, towed abreast and about 60 ft. apart behind the surveying vessel. Another apparatus, designed on the same principle, has been invented for catching and exploding mines.

¶Iron of a purity of 99.98 per cent has been produced in the laboratories of the University of Wisconsin.



The Manner in Which the Water-Kite Sounding Lead Tows

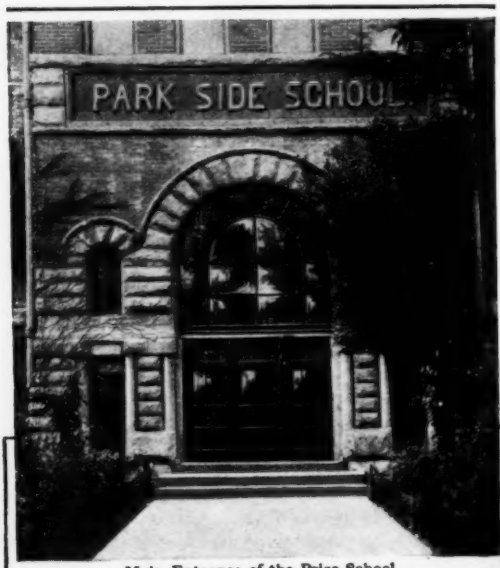
When an Obstruction is Met with a Bell Rings and the Device Rises to the Surface

SCHOOL GARDEN THAT WON PRIZE CUP

All the Chicago schools entered a competition for a cup to be given to the one which accomplished the most toward the beautifying of its grounds. The Park Side School won the prize. The points considered were: The best arrangement of flower beds, vines, trees, etc.; the greatest variety of plantings; the best judgment and care in location and arrangement of plants; well-kept grass free from weeds, and the most pleasing general results.

INSPECTION OF PANAMA LOCK GATES

In contracting for the construction of the gates for the Panama Canal locks the most rigid inspection was provided for, and it was specified that 5 per cent of the total price should be withheld until the gates shall have proved themselves satisfactory by actual use. The number of rivets required for the gates is in the neighborhood of 6,000,000, and each of these had to be examined and tested, the imperfect rivets being rejected and new rivets substituted.



Main Entrance of the Prize School

Photos by Kaufmann, Weimer & Fabry Co.

The Garden Which Won the Prize for the Best Chicago School Ground — The Prize Cup

NEW YORK'S HONOR-SYSTEM STATE PRISON

In the Great Meadows prison, 70 miles north of Albany, the State of New York is successfully working out the honor system that has made Colorado and Arizona famous for prison reform. The prison is simply a 1,000-acre farm, having a huge cell house, and a small stockade connecting it with the smaller buildings in which the mess hall, the offices, and the temporary chapel are located. Half a mile away from the cell house is a baseball diamond where the prisoners may play when working time is over, and on all parts of the 1,000 acres, in the woods, and on the mountain, which serves as a sheep range, prisoners may be seen at work, some of the gangs working without a single guard, and the others with not more than one guard. Two or three of the guards carry rifles, and the other guards have revolvers in their pockets, but these weapons have not been used since the Great Meadows prison came into existence a little more than a year ago.

Unlike the Colorado and Arizona prisons without walls, however, the Great Meadows prison is inhabited by only a picked group of prisoners. They are men transferred from Sing Sing, Auburn and Clinton prisons as being probably those most readily reformed. They have not been previously convicted of felony, so far as the prison records show. They have not passed a period in another prison. They are within a year or two of their release. The temptation to run away is balanced against the desire of making parole and getting a final discharge in a legitimate manner.

A CHANGEABLE SHOW-WINDOW DISPLAY

Quick changes in window display are made possible by an arrangement recently exhibited in New York. The device comprises three compartments, one above the other, and is operated like an elevator in the window space. To install the device an opening is cut in the floor nearly the size of the display-window platform. There should

Changeable-Compartment Show-Window Display

be an unobstructed depth of about 8 ft. beneath the flooring, and the ceiling should be about 14 ft. above the floor. The mechanism may be so arranged that only one compartment is on view from the street at a time, the display being changed every hour or two, or the compartments may be slowly moved up and down, city-water pressure furnishing the power. In changing the displays in the compartments, one compartment may be on exhibition while the others are being trimmed.

¶The stone used in the walls of a new Catholic church in Kansas City was originally used for the piers of a Missouri River bridge that was never completed.

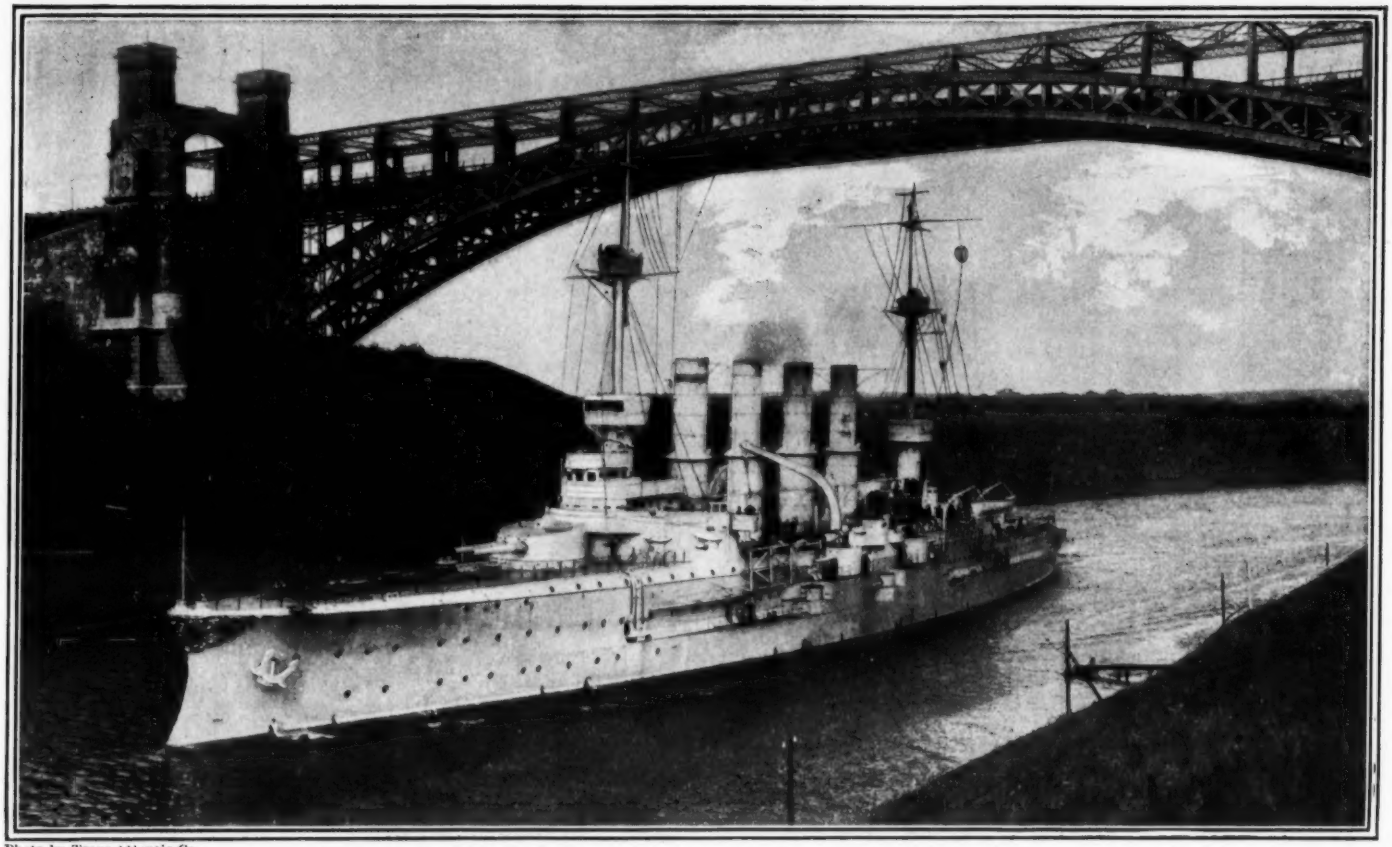


Photo by Trans-Atlantic Co.

The German Battleship "Roon" Passing under One of the Bridges of the Kiel Canal

KIEL CANAL TO BE WIDER AND DEEPER

The widening and deepening of the Kiel Canal, which connects the Baltic with the North Sea, will be completed in the spring of 1915, at an estimated cost of $56,000,000. The depth will be 45 ft., and the width will be considerably increased. Double locks, 1,082 ft. long and 147 ft. wide, thus larger than the Panama Canal locks, will be constructed at Holtenau and Brunsbüttel. All bridges across the canal, except the one at Rendsburg, which will be of the swing type, and one of the largest of its kind in the world, will be elevated sufficiently to give passage to the largest vessels.

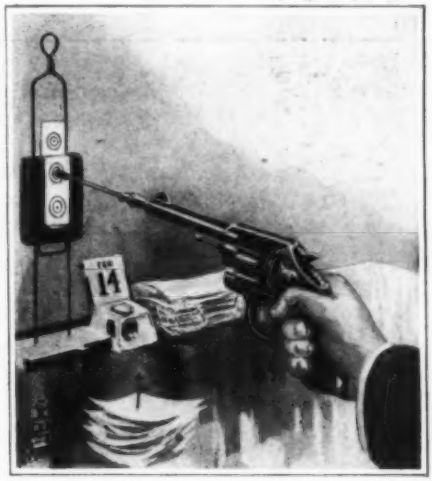
AUTOMATIC LIFE JACKET "RIGHTS" ITS USER

The construction of the buoyant compartments of this life jacket, designed especially for motorboat racers, is such as to turn the wearer automatically on his back when helpless, with head well out of water and resting upon the pad at the back. The adaptability of the jacket for persons of all ages is shown in the illustration, both the man and the little girl wearing the same size.

This Life Jacket Automatically Turns the User on His Back, with Head Well Out of Water

TOYLIKE BUT EFFICIENT REVOLVER RANGE

This is not a toy, but a remarkably efficient revolver range that is used in



Revolver Range That may be Used on a Desk or Tent Pole

the office of Maj. Gen. Leonard Wood, chief of staff of the United States army.

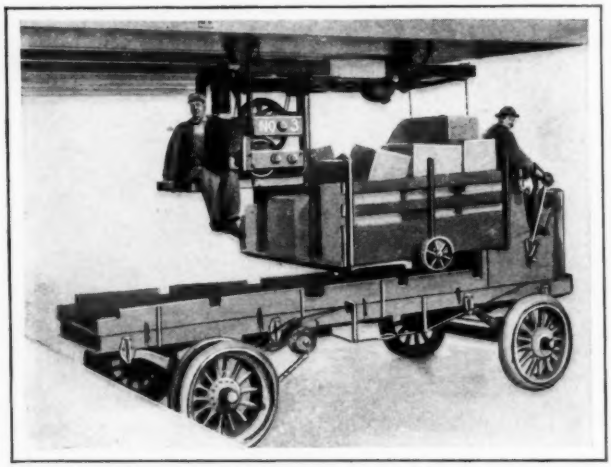
A tube is inserted in the barrel of the revolver. In this tube is a rod. When the hammer is snapped the firing pin strikes against the rod, driving the far end of it three or four inches from the muzzle. A spring draws the rod back into position. In using this revolver range, the marksman aims at the upper target and when the hammer is snapped the rod is driven against the lower one. Only an excellent shot can drive the rod against the bull's-eye.

LARGE BELT TRANSMISSION FOR ELECTRIC POWER

Notwithstanding the increasing employment of individual motors for the operation of machinery in factories, there are still many examples of single-belt drive for a main shaft. A belt 207 ft. long and 3½ ft. wide, running at a speed of 90 ft. per second, transmits nearly 3,000 hp. in an Austrian steel mill.

FREIGHT-HANDLING SYSTEM FOR LARGE WAREHOUSE

A large wholesale grocery firm of Los Angeles daily handles about 200 tons of goods of every description by the "telpherage" system, which consists of three electric trolleys, with a capacity of two tons each, which travel on the lower flange of an I-beam. The trucks of these trolleys are provided with hoisting drums for lifting the two specially constructed sections of each body from the automobile trucks used in conveying the goods to and from the warehouse. The trolleys carry the loaded sections from the automobile trucks to any part of the warehouse, or from any floor or section of the building to the motor trucks. The operator rides on a platform at the rear of the trolley, which has a maximum traveling speed of 500 ft. a minute.



Loading an Automobile Truck by the Telpherage System

¶The abandonment of the traditional queue or "pigtail" by the Chinese is throwing quantities of human hair on the markets of the world. Five tons in one shipment was recently offered in England for use in the woolen industry. Large quantities of it are woven into bags for pressing oil seeds.

GOVERNMENT TESTS PROVE VALUE OF TREATING TIES

As the result of a series of service tests of railroad ties that are being conducted by the United States Forest Service it has been ascertained that the average life of untreated ties laid in the experimental track of the Gulf, Colorado and Santa Fe Railroad Company is as follows: Loblolly pine and hemlock, 1½ years; tamarack, 2½; longleaf pine and red oak, 3; black oak and turkey oak, over 3½, and Spanish oak over 4 years.

In the testing of various species of ties subjected to treatment with preservatives before being laid and after having seen 7½ years of continuous service, it was found that treatment with preservatives will not yield good results unless the ties are sound in the first place, and that the species which, when untreated, decay most rapidly, appear to gain the greatest relative increase of life when treated.

NEW PROCESS FOR MAKING GOLD LEAF

In a new process for making gold leaf discovered by a London firm a highly polished aluminum ring, about 5 in. in diameter and 5½ in. wide, is covered with a sticky substance, such as a solution of gum, and allowed to dry. The sticky surface is dusted with metallic powder so that it is completely covered with a very thin layer of metal. This layer is then polished and the ring is turned slowly with its lower surface in contact with a solution of a nickel salt, the ring being connected to one pole of a battery, while the other pole is immersed in the nickel solution.

A coating of nickel is thus produced

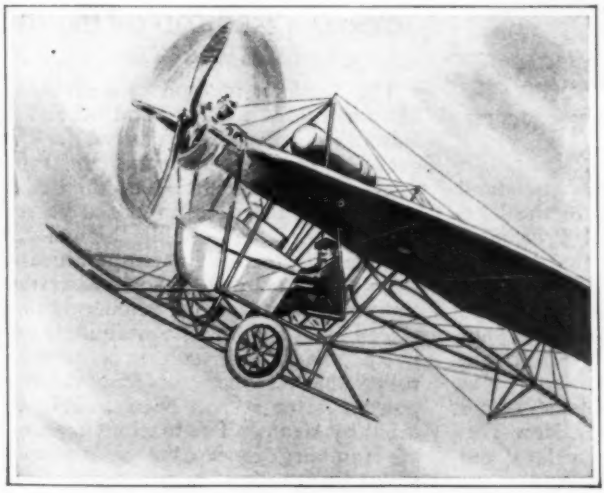
on the polished layer of base metal. The nickel deposit is washed and the ring is rotated with its surface in contact with a solution of gold, the electrical connections being as before, so that the latter metal is electrodeposited on the nickel. There are thus four layers on the rim of the ring, namely: gum, base metal, nickel, and gold, but each layer of metal is so thin that the combination is said to be even thinner than the best gold leaf. To remove the leaf from the aluminum ring a transverse cut is made in the film and, starting from this cut, the ring is turned slowly with its lower part immersed in a liquid which dissolves the adhesive substance, when the film falls from it and is received upon a band of paper traveling at the same speed as the rim of the wheel. The film and paper are then cut up and made into books.

A LIFELIKE DOLL FOR THE LITTLE FOLKS

A doll that has improved spiral-spring joints and is made of a material which will not chip or break, and claimed to be the most lifelike plaything yet designed for children, has been put on the market. The doll is sanitary because the material from which it is made is not affected by moisture and may, therefore, be washed with soap and water.

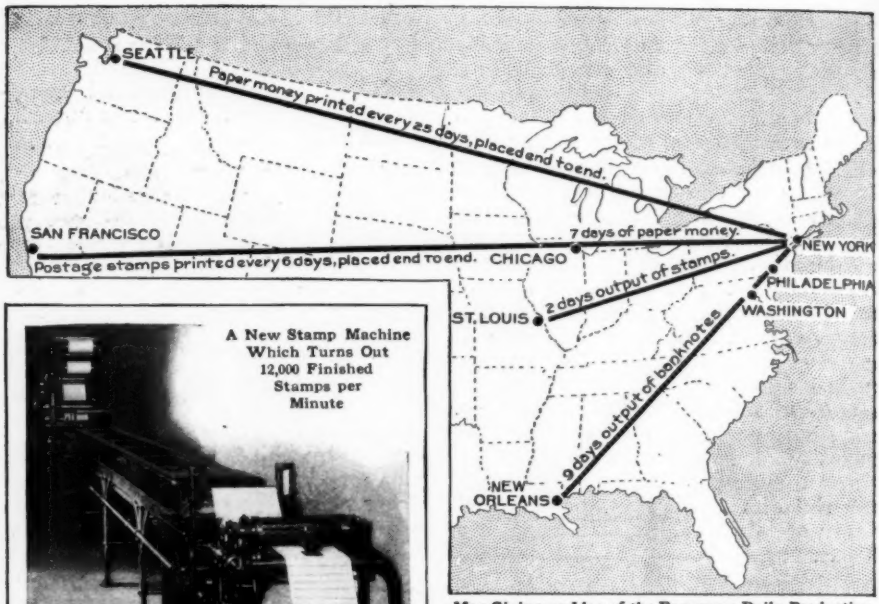
AEROPLANE WITH PENDULUM BODY MOUNTING

The body of this French monoplane, containing the pilot's seat and the steering apparatus, is suspended as a pendulum, free to swing forward and back. It is so connected with the tail plane, which is of unusual size, that any forward or backward tilt of the machine, swinging the body in the same direction, causes the tail plane to be depressed or raised, so as to automatically level the machine. The joint which permits the swinging of the body can be instantly locked by a special device whenever it is desirable that the pilot have absolute control of the motions of the machine, as in making an ascent or descent.

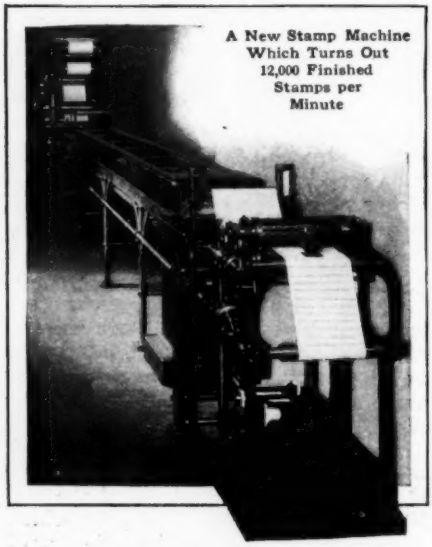


Automatic Longitudinal Stability by Means of a Pendulum Body

The pendulum arrangement is based on the observation that birds in flight always depress their tails when they lower their heads and vice versa. In a recent flight of this machine the pilot flew for a period of 35 minutes with folded arms.



Map Giving an Idea of the Enormous Daily Production of United States Stamps and Bank Notes



A New Stamp Machine Which Turns Out 12,000 Finished Stamps per Minute

THE STAMP AND BANK-NOTE PRODUCTION

The immensity of the postage-stamp and bank-note production of the U. S. Bureau of Engraving and Printing is excellently illustrated in the drawing. Twenty-five days' output of bank notes, placed end to end, would reach from New York to Seattle; nine days' output, from New York to New Orleans, and seven days' output, from New York to Chicago. Six days' output of stamps would reach from New York to San Francisco, and two days' output, from New York to St. Louis.

The other illustration shows a machine that turns out a mile of postage stamps, in finished form, in every five minutes of operation. This machine prints, gums, perforates, and either cuts into sheets or winds into coils, 12,000 stamps per minute. The bureau now turns out 40,000,000 stamps daily.

GERMAN METHOD OF USING FISH WASTES

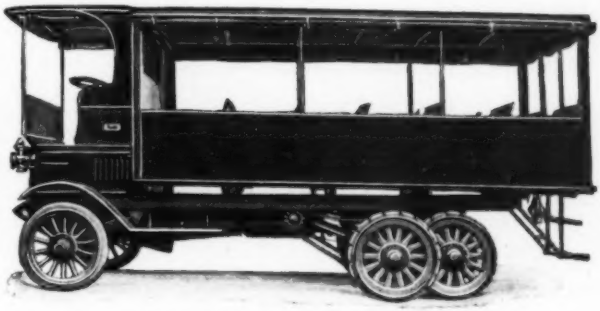
The German method of converting fish unsuitable for food and other fish wastes into valuable products, such as grease, glue, fertilizer and meal for fowls, consists in cutting up the bodies and placing the parts in closed vessels or "digestors" and boiling the mass by the use of steam at a temperature of from 248 to 284 deg. F. so as to extract the grease and glue. The mass is then placed in an apparatus containing a cylinder, inside of which is a movable roller that crushes the material into powder after it has been sufficiently dried by steam. The machinery in use at Hamburg is capable of digesting about three tons of raw material at one time, but the load is usually limited to two tons, the boiling process requiring from four to five hours, and the drying process six hours.

A MOTOR VEHICLE WITH EXTRA REAR WHEELS

A motor truck provided with four rear wheels instead of two, the main rear wheels and the extra rear wheels being mounted upon short axles connected with a movable bar in such a manner that the load is, at all times, equally distributed over all the rear wheels regardless of holes or obstacles, has been designed by a resident of New York City.

Power from the engine is supplied by side chains extending from a shaft under the chassis to the forward pair of rear wheels exactly as it is done in the standard truck, and the extra pair of rear wheels are driven at the same time by additional side chains that connect them with extra sprockets on the main rear wheels.

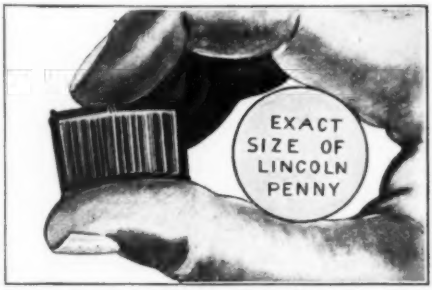
It is claimed that the extra pair of rear wheels secures a more powerful traction and enables the vehicle to turn around sharp corners without slipping, and that the cost of equipping a motor truck with dual wheels of this type is low enough to permit their general adoption.



Extra Rear Wheels for Motor Trucks

THE SMALLEST BOOK IN THE WORLD

A reproduction of what the Library of Congress catalogues as the smallest book in the world is here shown in comparison with an ordinary cent. Although the volume, which is paper-bound, measures only two-fifths by two-fifths of an inch and will easily rest upon the thumbnail, it contains 48 pages of Japanese paper upon which are printed an introduction and the complete Rubaiyat of Omar Khayyam, a famous Persian poet who lived more than a thousand years ago. Of this edition of the Rubaiyat only 57 copies were printed, numbered and signed.

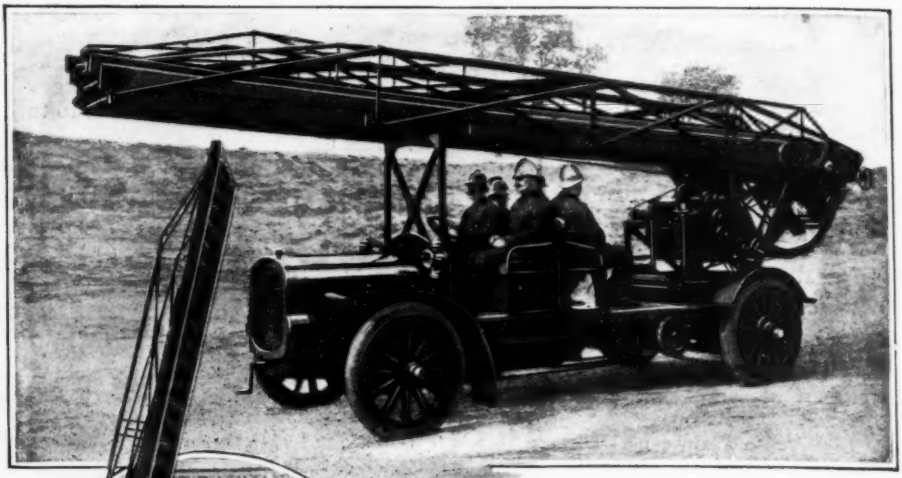


A Complete Book of 48 Pages

INCREASE IN RAILROAD EARNINGS

The total revenues of the railroads of the United States for 1912 amounted to $2,923,936,957, of which $2,033,474,191 was derived from freight traffic. Every mile of railroad, according to the report of the Interstate Commerce Commission, earned a net income above all expenses of $3,609 for the year, an increase of $163 over the net revenue per mile of line for 1911.

About 102 miles of streets in the Borough of Queens, New York City, were resurfaced during the last four months at an average rate of practically one mile per day. The cost was over $1,877,000.



Electrically Raised, 85-Ft. Turntable Ladder of Paris Fire Department

A 65-Ft. Ladder Ready to be Raised

THE FIRE DEPARTMENT OF PARIS

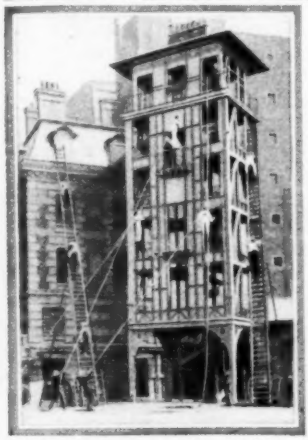
The fire department of Paris is noted for its effective work, much of its efficiency being due to drills in which various appliances are used daily until the firemen become thoroughly proficient. Drill towers, with balconies and projections similar to the six-story apartment buildings of the city, are used with scaling ladders, etc., and these appliances are also employed for drilling with extension ladders and the rescue of human beings by life lines.

The courtyards of some of the fire stations have fireplaces with tall chimneys for practice in putting out chimney fires. Demonstrations are given with a device by which obstructions or disabled horses can be raised and removed from the streets. The same device is also used on dangerous buildings, or in any place where the firemen are required to lift heavy weights.

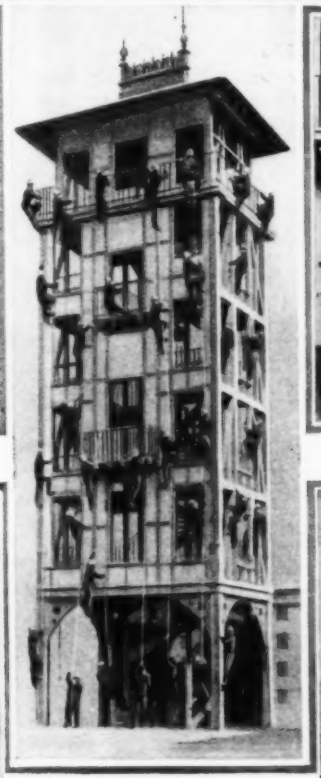
The fire department also uses models, illustrating types of buildings common to Paris, in giving the firemen instruction regarding fire prevention and the layout of buildings. When entering burning structures the firemen are clothed in leather jackets, cloth trousers and leather boots. They also wear helmets connected by hose with oxygen tanks strapped to their backs, with compressed-air tanks or with air-pumps operated from without.

The Paris department is under direct control of the minister of war. The men are paid the scale in force in the French army. The officers receive additional pay from the city after 15 years' service, and a pension from the government after having served continuously in the department for 25 years.

¶The world's wealth, as expressed in par value of stock exchange securities, is $115,800,000,000.



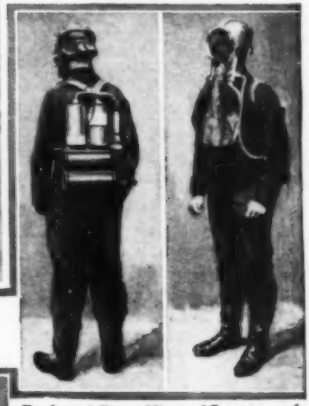
Using the Long Ladder and Life Lines in Rescue Work



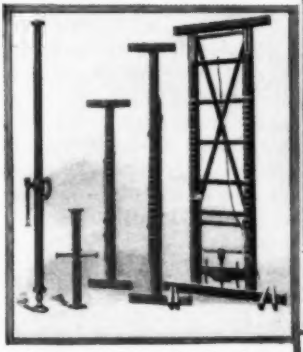
Part of Paris Fire Brigade in a Climbing Drill

Hook and Ladder Balcony and Window-Work Drill

Front and Back View of Air-Pump Smoke Helmet



Back and Front View of Compressed-Air Smoke Helmet



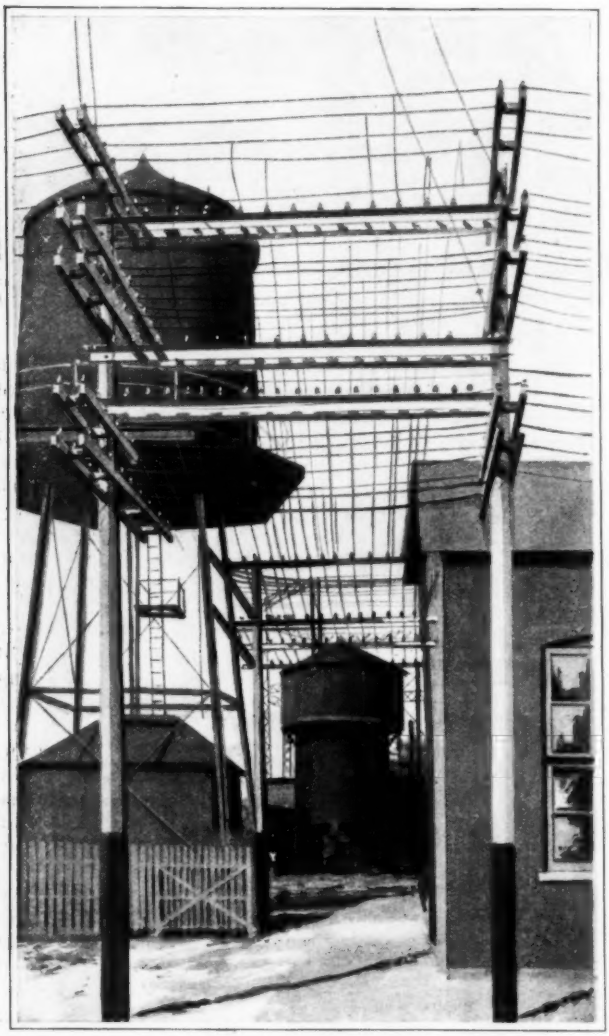
Devices for Supporting Sections of Dangerous Structures

Front and Back View of Oxygen Smoke Helmet

Windlass for Rescue Work on Dangerous Buildings

HOLLOW CONCRETE POLES CARRY HEAVY LOAD

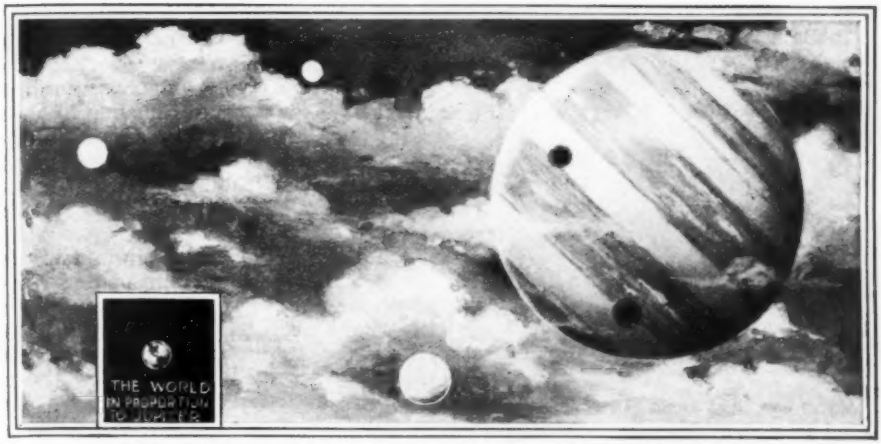
A demonstration of the strength of reinforced, hollow concrete poles is here shown. These poles, 45 ft. in height, carry the entire main line of the electric-power company in Oklahoma City. One of the features of the hollow concrete pole is the ease with which wires from overhead can be connected with underground systems, or with service wires, doing away with unsightly wiring from the tops of poles. Hollow concrete poles, 35 ft. long, with a diameter of 7 in. at the top and 16 in. at the ground, weigh 1,600 lb., and, when set 6 ft. into the ground, will carry a strain of 1,500 lb. side pull at the top.



Reinforced, Hollow Concrete Poles, 45 Ft. in Height, Carrying Electric-Power Wires

ORIGIN OF AUTOMOBILE BOUQUET HOLDERS

The bouquet holder for the automobile, which is part of the regular equipment of limousine and other inclosed cars, had its origin, according to one source of information, in the desire of a French automobile concern to pacify an exasperated American customer. It seems that an American woman ordered a car from the French concern some months in advance of an intended European tour, and expected to have the machine placed at her disposal on her arrival in Paris. At that time it was not unusual to order a chassis six months in advance of need, and then be disappointed at delivery time. The body was ready when the American woman arrived in Paris, but the chassis had not made its appearance. Explanation and apology were unavailing, but some days later the chassis arrived, and realizing that the lady's patience



Jupiter and Three of Its Moons — Comparative Size of the Earth Shown at Left

had been sorely tried, the makers sought some means of giving her a pleasing surprise. A quantity of costly flowers was bought, and to arrange them attractively in the car vases were used. The effect was so pleasing that the bouquet holder became part of the standard equipment of high-grade French cars and American builders quickly adopted it.

THE PLANET JUPITER IN THE MAKING

The planet Jupiter and presumably the still farther distant planets may be said to represent the younger members of the celestial family of worlds of which our earth is in the prime of life, the moon its dead offspring, and Mars an older brother; yet Jupiter, the largest member of this wonderful family, interests us more because, beyond Mars, he is our nearest neighbor. Jupiter also commands our attention more than the others because the few glimpses that astronomers have had of his surface lead them to believe that he now is in a condition immediately preceding the formation of a solid crust, water and land—a state through which our earth once passed.

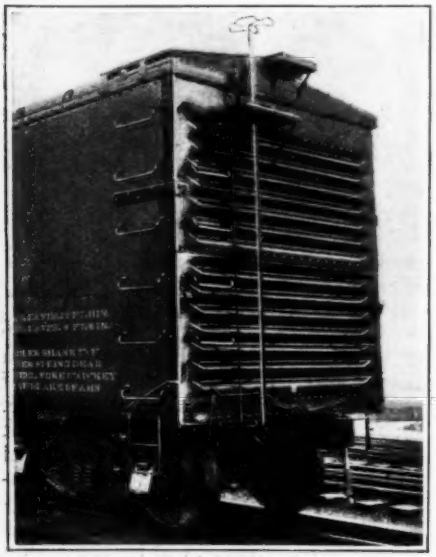
When viewed through a powerful telescope the surface of Jupiter appears to be streaked with shades of gray in which brighter and darker spots of many and changing forms are visible. It has been discovered, however, that these shades and spots are not the real surface of the planet, but a deep atmosphere of clouds and vapors, the changing forms and motions of which are not caused by winds, but by the action of heated currents of air or other gases rising from the planet.

As the dark spots of this atmosphere frequently assume the color of light rose or reddish brown, as if reflecting some great fire, the astronomers have decided that the lighter parts of the atmosphere are oceans of water vapor, while the darker spots are holes in the atmosphere through which a glimpse of the real surface of the planet may be had with a sufficiently powerful telescope.

Jupiter revolves around the sun five times as far away as the earth and requires almost 12 years to complete one revolution. Four large and four small moons accompany the great planet, which rotates around its own axis in about 10 hours. The size of Jupiter is such that 1,300 worlds as large as the earth could readily be contained within its interior, yet its specific gravity is so small that the planet would be outweighed by slightly more than 300 earths.

STEEL ENDS TO PREVENT LOSS OF GRAIN IN BOX CARS

Corrugated steel plates are now placed on railroad box cars at their



Corrugated Steel End for Grain Cars

ends to prevent loss of grain. Shifting loads of brick, lumber and steel rendered the wooden ends useless for the carriage of grain, it having been found that 70 per cent of the box cars in service were not grain-proof.

INFLUENCE OF COLORED PAPER ON LIGHT

Most attention has hitherto been given to the color value of illuminants, when, after all, according to M. Luckiesh, in a paper read before the Chicago section of the Illuminating Engineering Society, it is the color value of the useful light that is of greatest interest to the user—that is, not the color of the light as it leaves the lamp, but the color it is given by reflection from the walls and ceilings. The light from the metallic filament lamp has been lauded by many because of its nearer approach to daylight than many of the other common illuminants, while a few have expressed favor for the "softer" yellow glow of the carbon filament lamp. Yet experiments show that only a moderately yellow paper is required to change the color of tungsten light to that of a carbon filament lamp. In indirect lighting the colored walls and ceiling, even though nearly white, appreciably effect color changes in the light.

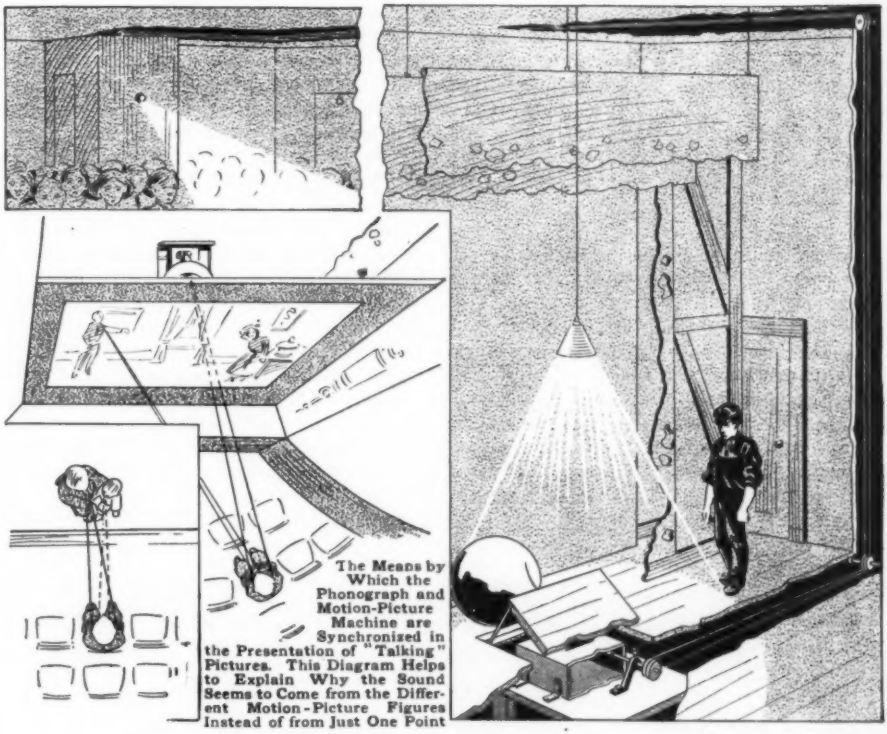
In direct artificial lighting much less light reaches the working plane by reflection from the walls and ceiling than in semidirect or indirect lighting. In the latter system all the light which is diffusely reflected by colored walls or ceilings is altered in color. When the amount of reflected light is small, especially in direct lighting, the influence of colored paper is small, owing to the small amount of colored light added to the direct light.

FISH MADE FROM GOLD COINS

Upon the roof of an old castle in Japan are nets under which may be seen two fish that were made from 2,000 gold coins. Each fish is 9 ft. long and 8 ft. wide and the coins are each 3 in. by 2 in. in size. The fish are kept under nets to prevent the coins from being stolen.

Real Gold Fish are on the Roof

THE TALKING MOTION PICTURES



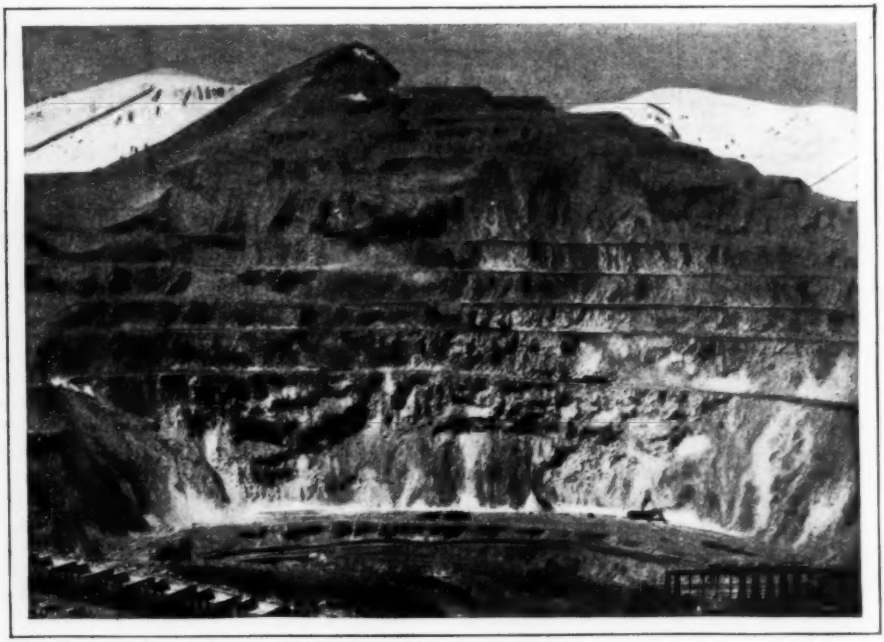
The Means by Which the Phonograph and Motion-Picture Machine are Synchronized in the Presentation of "Talking" Pictures. This Diagram Helps to Explain Why the Sound Seems to Come from the Different Motion-Picture Figures Instead of from Just One Point

Just how the new talking motion pictures are operated, and why the voices of the people appearing on the screen seem to come direct from the mouths of each, are questions which many people ask whenever the "talkies," as they are now called on New York's East Side, are shown.

One of the illustrations herewith shows the connection by means of which the motion-picture machine, high up in the gallery of the theater, and the phonograph, located in a well in the stage just behind the screen or curtain, are synchronized, or made to operate at the same time and speed, so that the motion of the lips in talking and singing may be simultaneous with the utterance of the sound. Every sound or noise made by the persons producing material for the "talking" pictures is caught by a single phonograph recorder while the motion-picture camera is taking the pictures. In reproducing the talking pictures all that is necessary is to provide that the phonograph and the motion-picture machine be run in the same relation to each other as when the pictures were made and the sounds recorded. This is done by mechanically connecting the motion-picture projecting machine and the phonograph by means of an endless wire cable running over pulleys. The cable passes under the floor of the stage, up to the top of the proscenium arch, and across the upper regions of the theater by air route to the motion-picture machine. Should the cable slip and so throw the two machines "out of step," so to speak, the operator of the projector can retard or increase the movement of the pictures until they are again synchronized with the phonograph.

Although the sound seems to come direct from the picture of the particular person or instrument represented as producing it, no matter whether at the right, the left or in the center of the screen, it all actually comes from just one point—the horn of the phonograph. That it seems otherwise to the audience is due to the same illusion that makes ventriloquism possible. The stage ventriloquist does not, as popular belief has it, "throw" his voice. He simply talks or sings without moving his jaw and with no perceptible movement of the lips, working the jaw of the manikin at the same time. The eyes and imagination of the audience do the rest, the human ear being seldom able to distinguish a variation of several degrees in the direction of sounds that strike both ears at the same time and with the same force. To make the illusion as perfect as possible the screen used for the talking pictures is considerably narrower than the ordinary motion-picture screen or curtain.

The accompanying diagram illustrates the principle. Referring to this diagram, two motion-picture figures, going through the facial movements that accompany utterance, would, one at the extreme right and the other at the extreme left of the screen, be still close enough in line with the real source of sound so that the audience, a little distance back, could not tell from which it was coming if there were no facial movement of either, but, "listening" with the eyes as well as with the ears, the sound seems to come from the one whose lips are moving. Were the screen so wide, however, that some of the talking figures might be shown a considerable distance to the right or left of the source of sound the illusion would be lost.



View of the great copper mine at Bingham, Utah. From the pit to the dome the height is nearly 3,500 ft. The ore body, which has less than two per cent copper, was covered by an average of 106 ft. of dirt and rock, and steam shovels remove this capping and get to the ore. More than half a million tons are removed each month, and the amount of ore treated at the mills averages 21,000 tons a day.

MUSHROOM-POISON TESTS UNRELIABLE

As far as the general public is concerned "toadstool" stands for the poisonous and "mushroom" for the edible varieties of the fleshy, umbrella-shaped fungus, and the popular mind always seeks some test by means of which the toadstool may be distinguished from the mushroom. So far as is known, however, there is not a single test, short of chemical analysis, which will give results of any value whatsoever, according to a circular sent out by the University of California.

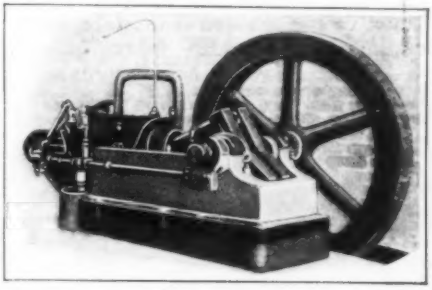
The "silver test," which consists of placing a silver spoon or coin with the toadstools while cooking, is the most prevalent. The popular idea is that, if the silver blackens, the toadstool is poisonous. This is absolutely unreliable because there are both poisonous and nonpoisonous species which act alike on silver. Another idea is that if the outer or upper skin of the top of the toadstool peels off readily it is edible, while, in actual fact, some poisonous species will also peel, and certain edible species will not peel.

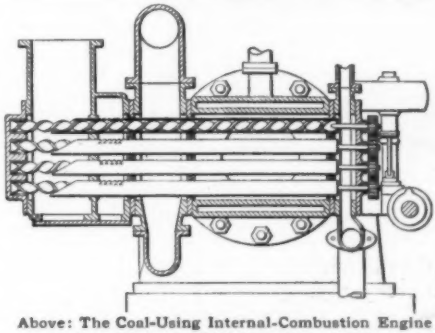
All toadstools or mushrooms should be avoided in the young or "button" stage, as, at this time, it is impossible to determine, except after long experience, some poisonous from some edible species. It is also wise to avoid all species with gills, white spores, a ring, and a bulblike base, as the most poisonous species are in this group. Those having the cap thin in comparison with the gills, especially if they are bright-colored, and all toadstools which are not strictly fresh, since decay sometimes greatly increases poisonous substances, should likewise be avoided.

GAS ENGINE RUNS ON COAL FUEL

In a 1911 issue of this magazine was described an internal-combustion engine, then in its experimental stages, which used coal fuel. In one of the accompanying illustrations may be seen this engine as it appears in operation.

The coal used is fed into a hopper from which it is taken by four worm conveyors through the heater tubes.





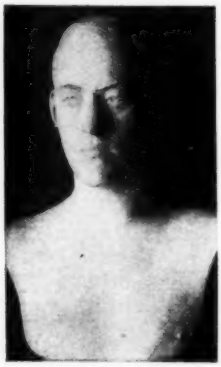
Above: The Coal-Using Internal-Combustion Engine
Below: Diagram of Coal-Feeding and Gas-Forming Section

These tubes pass through the exhaust and combustion chambers of the engine, the heat therein bringing the coal to incandescence. Air, or a mixture of steam and air, is drawn over this incandescent coal by the suction of the engine and mixes with the gases given off from the coal. This mixture passes into the cylinder of the engine. In starting, the coal is brought up to incandescence by running a few minutes on illuminating or other available gas.

¶A recent contributor to Popular Mechanics Magazine, writing from Canada about the Martello towers at Kingston, Ont., stated that there are none of these relics of early coast defenses in the United States. Several correspondents along the South Atlantic coast have called our attention to the Martello towers of Key West and the famous old tower on Tybee Island, off the Georgia coast.

CASTS OF HUMAN BODY BY NEW PROCESS

A new process of making either plaster or metal casts of the face, bust, or the entire human body, known as "sculptography," has been perfected by an inventor of Boston. By means of compressed air there is sprayed over the part to be reproduced a coating of warm liquid that quickly forms a hard shell or mold which is removed and plaster of Paris poured into the mold. When the plaster is sufficiently set, the mold is removed and the reproduction is electroplated with a thin coat of copper, thereby giving the appearance of solid metal. It is claimed that the molding liquid will not stick to the hair, eyebrows or mustache, and the texture of the finest skin is faithfully reproduced. The head and bust shown was reproduced at one sitting of approximately 45 minutes.

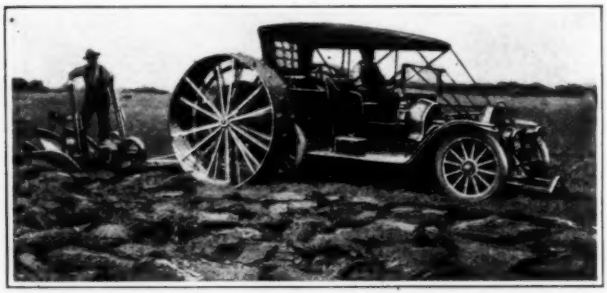


IRON ENOUGH IN SIGHT TO LAST 360 YEARS

The supply of iron ore available under present methods of mining in the entire world has been stated by geologists of international reputation at 22,000,000,000 tons, from which it is estimated 10,000,000,000 tons of iron may be produced. At the present rate of consumption, this supply would last the world about 60 years. There are, however, more than 123,000,000,000 tons of ore not now commercially available, which, with improved methods of production, may be made to yield in the future an additional 53,000,000,000 tons of iron, which would run the world along for another 300 years, if no more iron were used annually than at present.

TOURING CAR CONVERTED INTO FARM TRACTOR

A distinctly new type of farm tractor, which can readily be connected to any automobile of standard make and size in a few minutes, is on the market.



New Type of Automobile Tractor Drawing Three 16-In. Plows in Sod

The tractor, as shown in the illustration, is equipped with a pair of 6-ft. steel wheels with approximately 12-in. tires, heavily spiked to insure ample traction under the most severe conditions. These wheels, mounted on a rigid axle to which a heavy steel frame is attached by means of a pair of "chairs" bolted over the axle hub, support the rear end of the automobile and raise its rear wheels from the ground. The front wheels remain on the ground and carry one end of the tractor frame suspended from their axle. The power is transmitted from the automobile wheels through a spur gear which is secured in place on the hubs of these wheels by a specially designed hub cap. This gear is kept from rotating on the hubs of the automobile by a fingered casting

which engages with the rivet heads used in the construction of the automobile hubs. The tractor gearing is so designed that two speeds—one of two miles per hour and one of four miles per hour—are available while the automobile engine is running at its full speed; that is, at a speed which would drive the automobile 25 to 30 miles per hour when on the road.

An auxiliary radiator is mounted on the rear of the tractor and is connected with the cooling system of the automobile by hose connections and pipes. The water circulates through both the auxiliary radiator and the regular radiator of the automobile. A circulating pump and fan and a storage tank holding 24 gal. of water are used in connection with the auxiliary radiator to insure the cool operation of the automobile engine. The tractor, which can be attached to an automobile by one man in about five minutes and disconnected in half that time, is adapted for plowing or any other farming operation in which tractors of the ordinary type are used.

A BLACKSMITH'S NOVEL ADVERTISEMENT

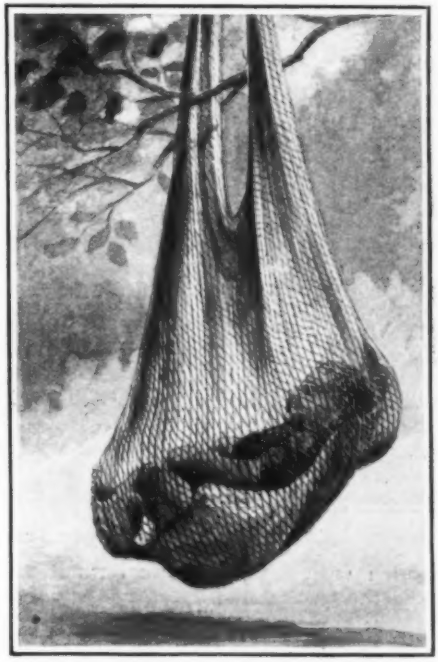
A progressive blacksmith of New Mexico, who makes a specialty of shoeing horses, originated an odd method of advertising by piling old horseshoes around a post supporting his signboard.

Blacksmith's Horseshoe Signpost

¶During 1912 the United States produced 3,124,746,000 bu. of corn, 730,267,000 bu. of wheat, 1,418,337,000 bu. of oats, 223,824,000 bu. of barley, and 35,664,000 bu. of rye.

PAPUAN CRADLES RESEMBLE ORIOLE'S NEST

The cradles constructed by the natives of British New Guinea somewhat resemble in shape the nest of a



A Nestlike Papuan Cradle

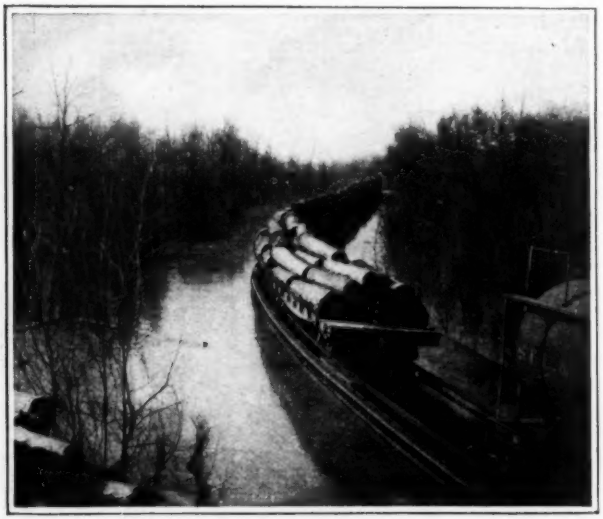
Baltimore oriole. One writer describes them as a cross between a bag and a hammock. They are made of netting and are hung from the branch of a convenient tree or from a crosspiece in the huts.

"There are some Papuan villages in which children absolutely swarm," says the author of Papua, or British New Guinea, "but there are few large families."

¶An oyster grower of Crisfield, Md., raises oysters under almost perfect sanitary conditions by having his oyster beds, utensils and employes examined regularly to detect the presence of disease germs.

RAILROAD TRACK HELD DOWN BY LOGS

When floods threatened to carry away a section of railroad near Memphis recently, a long string of flat cars, loaded with logs, was run onto it to hold the track down.



Long Train of Logs Prevents Track from being Carried Away by Floods

AVIATION STATIONS IN SAHARA DESERT

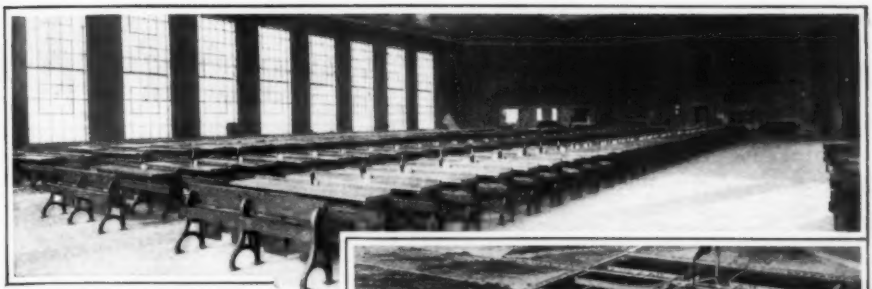
The successful long flights made by the French military airmen over the Sahara Desert has led to serious consideration of the practicability of extending the radius of such flights as far south as the Niger River. Military camps will be established at distances of 200 miles apart between Biskra, Algeria, and Timbuktu, in the Sudan, a distance of close to 1,500 miles. At present it takes several months to reach Timbuktu from Biskra, while aeroplanes should be able to make the trip in three or four days. The aerial line is primarily intended for the carrying of mail.

¶American canneries put out more than 500,000,000 cans of green corn annually.

MINNESOTA'S NEW PENITENTIARY

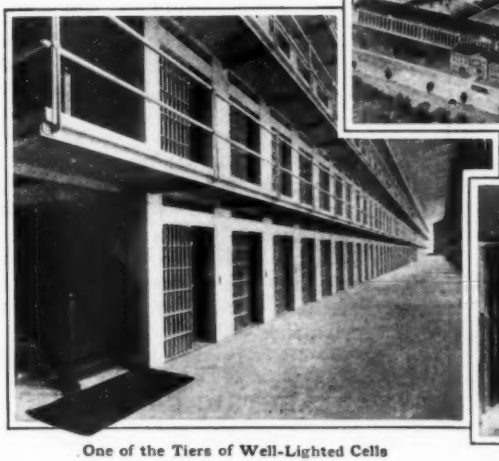
Minnesota's new prison, which cost $2,000,000, was constructed on lines which make it one of the best and most modern, architecturally, in the United States, if not in the whole world. Its buildings, which are strictly fireproof, are plain, but substantial and comfortable, following in construction all the laws and rules for obtaining the best hygienic and sanitary conditions.

The new prison is located two or three miles from the old, at Stillwater. The site was selected with particular care as to location and source of pure spring water, the prison farm covering 160 acres, and the prison inclosure proper, 22 acres. From the front is a broad view of the St. Croix Valley, and in the pretty country at the rear is a spring capable of furnishing 1,500,000 gal. of pure, cold water daily. The buildings are of brick, surrounded by a concrete stockade 26 ft. in height. There are two cell houses, each containing 512 cells. Practically one-third the outside walls of these houses is glass, and there are skylights over the halls, the result being a vast change from the dark, dismal cells of the past. A hospital, thoroughly equipped, adjoins the administration building. The factory buildings and warehouses for the manufacture of farm machinery and binder twine, which are this prison's big industries, are thoroughly modern manufacturing buildings in every respect. The twine factory is 360 ft. long by 86 ft. wide.

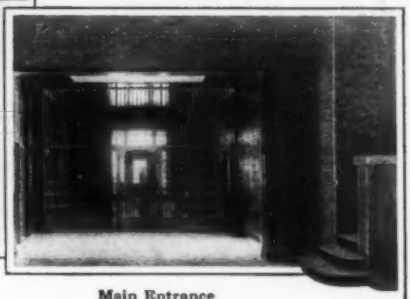


The Main Dining Room

Bird's-Eye View of Minnesota's New Prison

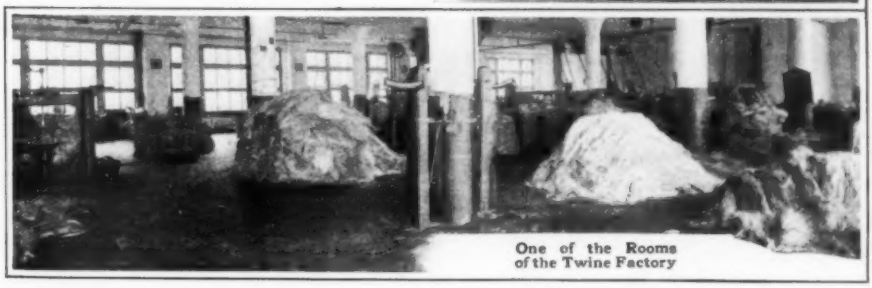


One of the Tiers of Well-Lighted Cells



Main Entrance

This is Where the Food is Prepared



One of the Rooms of the Twine Factory

MENDING THE CRACKS IN ST. PAUL'S CATHEDRAL

Much anxiety has been felt in England because of the great cracks appearing in the famous St. Paul's Cathedral, and steps are to be taken to repair its foundation. In the meantime the cracks are being "healed" with cement in the manner shown in the illustration. The compressed air drives the cement into the farthest corners of the crack, causing the stone to bind together again.

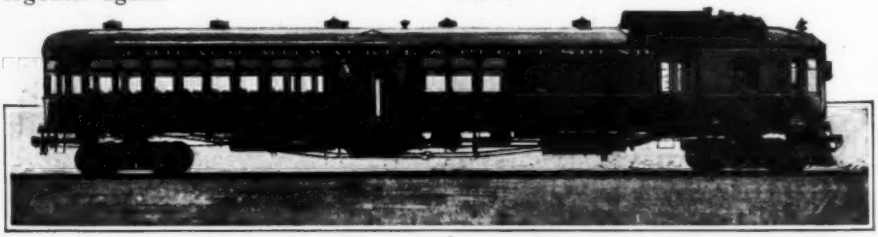
Compressed-Air Machine Forcing Cement into the Cracks in St. Paul's Cathedral Walls

THE FALLING PROFIT OF FARM PRODUCE

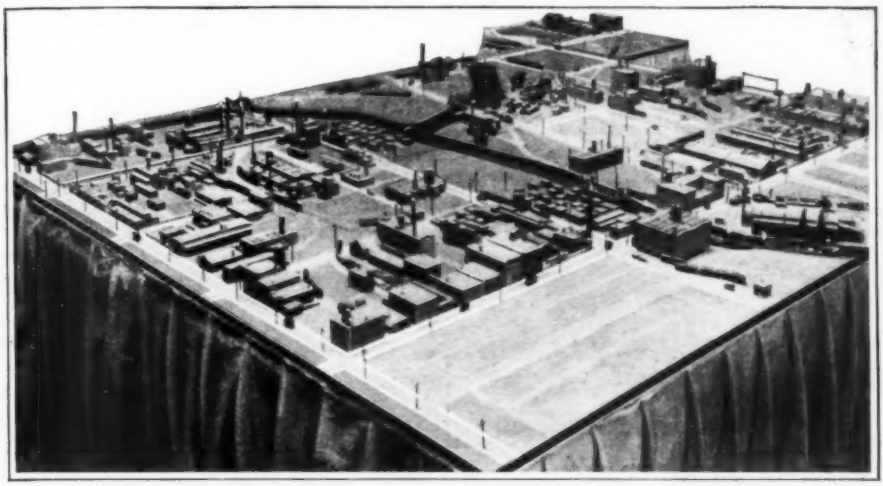
Few people realize, with the exception of those intimately concerned with the producing end, that, regardless of the "high-cost-of-living" cry, the farmer is now receiving less for many staple crops than in 1910. On February 1 of this year the average price received for corn per bushel was 50 cents, as compared with 65 cents on February 1, 1910; the price for oats was 32, as compared with 45 cents; barley, 51, compared with 59, and flaxseed, $1.06, compared with $1.92. On February 1, 1910, the farmer received $12.35 per ton for hay as compared with $11.64 this year, while in 1913 he was getting 22 cents for eggs as compared with 28 cents in 1910. Apples brought $1.06 cents per bushel February 1, 1910, and only 74 cents in February of this year. These figures are from the official report of the United States Department of Agriculture.

GAS-ELECTRIC CAR MAKES LONG RUN

One of the longest single trips ever made by a self-contained electric car was recently accomplished by a gas-electric coach built for one of the big railroad systems. It made the trip from Chicago to Tacoma, 2,201 miles, without any delay, meeting the regular schedule speeds and climbing the grades with ease. It will be used on one of the branch lines running out of Seattle. This type of coach is becoming increasingly popular for use on branch lines having a limited passenger traffic.



A Gas-Electric Car Which Ran 2,201 Miles on Steam-Train Schedule



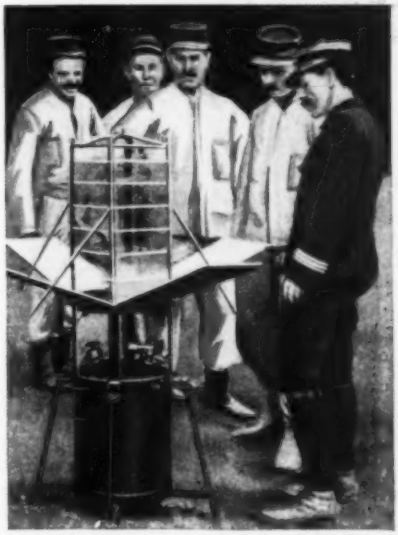
A Chicago Manufacturing District Shown in Miniature

LOCATING FACTORIES BY MEANS OF MODELS

A model, 15 ft. square, reproducing in miniature a Chicago manufacturing district comprising 300 acres of land, and showing the location of the factories so far erected, the course of the river, location of railroad tracks and arrangement of streets, has proved an excellent means of quickly convincing manufacturing concerns of the advantages and opportunities of the district. Every detail of the plants and railroad trackage and connections are reproduced in plaster, cement, wood and papier-maché. A number of freight trains are shown leaving and entering the district, and freight boats and tugs are shown in the river. The model is being exhibited at real estate and industrial expositions.

ILLUMINATION PROJECTORS OF THE FRENCH ARMY

Illumination projectors of a simple and particularly effective type have been adopted by the French army. Kerosene oil, carried in the tank that forms part of the base of the light, is vaporized and fed to an incandescent mantle burner which gives as high as 4,000 cp. To the four sides of the glassed-in frame containing this burner are hinged reflectors which may be set at any angle desired. For general camp illumination they are dropped down, but by raising them all to the required angle, a powerful volume of light can be thrown into the sky. This light will not penetrate as high as the



Apparatus for Throwing Light into the Sky

beam of a powerful searchlight, but, being much less confined, illuminates a far greater space.

FIR TREE AS WINDMILL TOWER

An illustration of a windmill in a tree was published in a recent issue of this magazine. This is another one,

Windmill Mounted on a Fir Tree

slightly different, located in Scappoose, Ore. The fir tree which serves as the tower was cut off at a height of about 60 ft. from the ground, a well was sunk at the foot of the tree, and a tank house was attached to the side of the trunk about 40 ft. above the ground.

¶The microphone of a telephone transmitter becomes much more sensitive if the air surrounding it is rarefied, as by heating, and German inventors are working on a practical application of this discovery.

WHAT ELECTRIC DELIVERY COSTS PER TON-MILE

The following table of the comparative cost of delivering merchandise by horses and motor trucks was compiled by an electric-truck manufacturer from observing the 1,500-lb. delivery service of a large department store, a two-ton service of general-merchandise delivery of parcels of medium size, and a five-ton service of large boxes of similar goods delivered over a wide area.

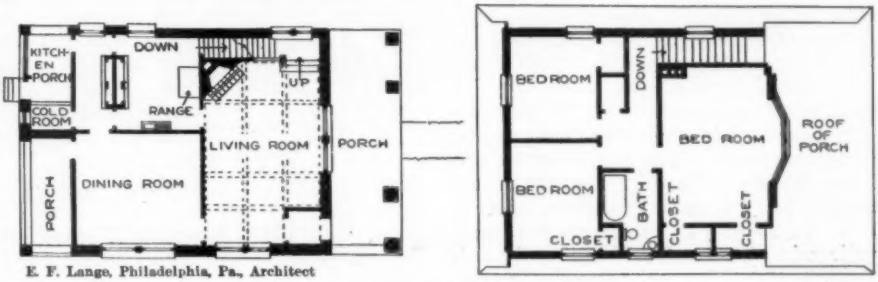
	1500 LB.		TWO TONS		FIVE TONS	
	Horses	Electric	Horses	Electric	Horses	Electric
Miles per day	17	30	16	30	12	24
Ton-miles per day	12.75	22.50	32	60	60	120
Cost per day	$6.00	$6.00	$6.37	$8.50	$9.10	$11.00
Cost per mile	0.35	0.20	0.52	0.28	0.76	0.45
Ton-mile cost	0.466	0.207	0.26	0.14	0.15	0.09

The figures given include all expenses, such as electricity at four cents for each kilowatt-hour; $15 per week for chauffeurs' wages; 12½ per cent each year for depreciation and payment of 6 per cent interest on investment; also taxes, insurance, and the annual renewal of battery plates and tires.

HANDLING ORE IN ALASKA AT "FIFTY BELOW"

The handling of ore at a temperature of 50 deg. below zero is a problem that would baffle most railroad and mining companies in the United States. In Alaska the problem has been solved by building ore cars with false bottoms under which pipes are laid through which steam is passed from a large boiler located at the ore bunkers. Throughout last winter ore was hauled daily from White Horse to Skagway in exceedingly low temperatures and, by the application of steam at the Skagway terminal, the ore was thawed so that no difficulty was experienced in dumping the cars.

A TWO-STORY SUBURBAN HOME



E. F. Lange, Philadelphia, Pa., Architect

Floor Plans of House Suitable for Suburbs

The arrangement of the first floor of this two-story suburban home provides for a living room, 21 by 13 ft.; dining room, 14 by 13 ft.; kitchen, 11 by 9 ft. 6 in.; pantry cold room, closets, front porch, 8 ft. wide, extending along entire front of house; rear porch, 12 by 5 ft. 6 in., and a kitchen porch. The second floor has two bedrooms, each 12 by 11 ft. 6 in.; owner's front bedroom, 18 by 12 ft., with bay window; bath and five closets.

SPELLING BY ANALOGY

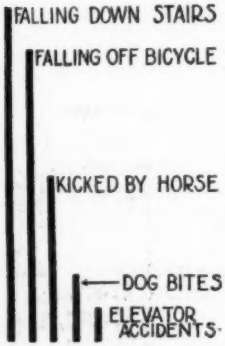
The controller of the central telegraph department of the post office of Great Britain has supplied to his subordinates an official list of words to be used in what has been called "spelling by analogy." It is employed in the room where telegrams sent by telephone are received, the idea being to give clearness when it is necessary to spell out a message, or any part of it, over the wire. Here is the official list:

A for Apple	N for Nobody
B for Brother	O for Orange
C for Charlie	P for Peter
D for Dover	Q for Queen
E for Easter	R for Robert
F for Father	S for Sugar
G for George	T for Tommie
H for Harry	U for Uncle
I for India	V for Victoria
J for Jack	W for Wednesday
K for King	X for Xmas
L for London	Y for Yellow
M for Mother	Z for Zebra

It is not insisted on that patrons stick to the post-office alphabet.

ONE HUNDRED THOUSAND ACCIDENTS CLASSIFIED

Extremely interesting accident statistics have been compiled by the Chamber of Commerce of Rochester, N. Y., with results which may surprise many people. The classification is of 100,000 accidents on which several casualty insurance companies have paid out $7,455-568. Heading the list, as might be expected, are the travel accidents, with a total of 29,726, of which 24,936 were railroad; 4,356 street-car, and 434, steamboat and steamship accidents. But the type of accident to come second—that of falls—is distinctly surprising, the total being 18,367, or more than 18 per cent. Of these, 8,222 were falls on the pavement, and 1,946 falls from chairs and ladders. Accidents having to do with carriages, wagons and horses come third, with a total of 8,135, while the number of automobile accidents among this particular 100,000, was only 1,620, or about 1½ per cent.

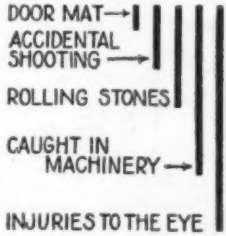


It is likewise interesting to note that 209 of the accidents were caused by tripping over door mats and rugs, that there were 4,217 cases of fingers crushed in various ways, 2,969 burns and scalds, 2,877 athletic accidents, 681 bathing or drowning accidents, but only 579 gunshot wounds.

In addition to the above, there were 4,678 persons cut with edged tools or glass; 2,781 injured by the falling of heavy articles; 2,771 bicycle accidents, which shows that bicycling is still extensive in America; 2,417 accidents while lifting heavy articles; 2,083 eye injuries; 1,895 cases of blood poisoning; 1,555 persons cut or bruised by machinery; 1,500 cases of feet being injured by stepping on nails or glass; 1,419 cases of toes crushed in various ways; 1,238 hands lacerated by hooks, nails or wire; 903 slips on rolling stones; 716 bites by dogs or insects; 483 cases of splinters in hands or feet; 385 accidents by contact with furni-

ture in houses; 394 assaults; 291 elevator accidents; 131 cases of fingers caught in electric fans, 96 motorboat and 4,884 miscellaneous accidents.

The same organization has compiled statistics from information furnished by an Eastern railroad, which dispels the popular impression that most of the persons killed while walking on railroad tracks are tramps and vagrants. Out of 964 accidents occurring to trespassers on the railroad right of way, 268 of those injured were laborers, 81 shopmen and mechanics, 44 farm hands 70 school children and students, 32 railroad employes, 8 sailors, 5 soldiers, 8 miners, 3 musicians, 1 teacher, 2 fishermen, 2 shoemakers, 4 horse dealers, 4 lumbermen, 3 watchmen, 2 messengers, 3 bakers, 1 contractor, 2 barbers, 3 nurserymen, 18 merchants, 3 cigar makers, 6 hotel men and bartenders, 2 coachmen, 3 linemen, 10 engineers, 4 clerks, 1 chemist, 19 persons of no occupation, 349 whose occupation was unknown, 1 minister, 1 actor and 1 escaped inmate of an insane asylum.



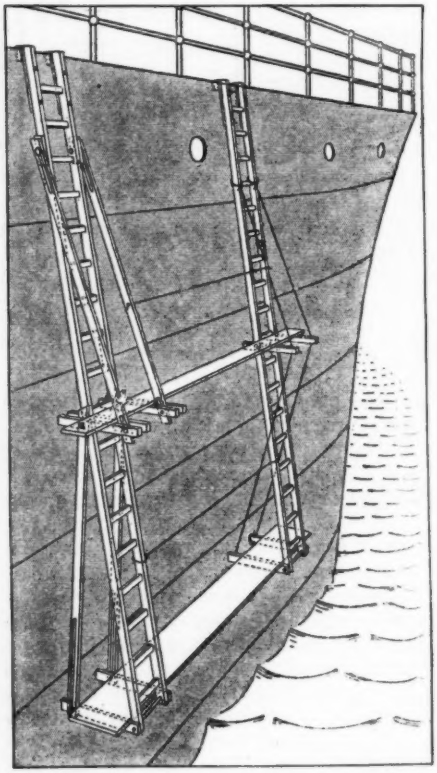
A NEW FUEL FOR AUTOMOBILES

A new fuel to be used in place of gasoline for internal-combustion engines is expected to make its appearance in England this summer, the plant for its manufacture now being under construction. The new fuel is made from gasoline, kerosene and benzol, is said to act in all respects like gasoline, has a good heat value and can be sold for from 25 to 30 per cent less than gasoline.

The experimental plant used in its manufacture comprises what is termed an "agitator," and various settling tanks. An electric motor operates an air compressor which sends a current of air through the agitator tank to keep the contents in constant motion. The gasoline, kerosene and benzol are each treated separately with a certain quantity of acid in this agitator, a dark, brown liquid resembling tar being extracted from the benzol, a yellow-white precipitate from the kerosene, and a highly refined gasoline from the gasoline. By the mixing together of the three, in certain proportions, a colorless liquid is obtained which is clean to the touch. The exhaust from it is almost odorless. In tests of this fuel no trouble was experienced in starting a cold engine or in running for long periods. Carburetors do not have to be readjusted for its use.

PAINTERS' SCAFFOLDING FOR SHIPS

A scaffolding particularly designed for use in cleaning, painting, or repair-



The Scaffolding as Used in Painting a Ship's Hull

ing the hulls of ships is here shown. When not in use it can be folded so as to occupy but little space. The stretchers connecting the struts with the ladder uprights may be rigid and have slotted connection, or may be composed of cable.

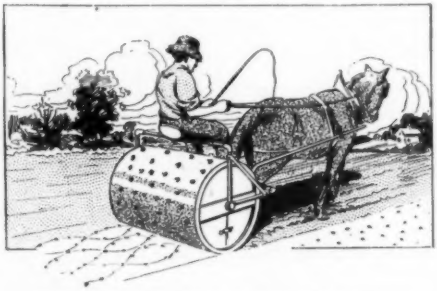
¶The authorities of St. Paul's Cathedral, London, have protested against the proposed construction of a tramway tunnel beneath the churchyard of the cathedral, claiming that such would seriously weaken the eastern foundations of this famous structure.

STEEL-BLOCK TIRE FOR MOTOR CARS

A new type of tire for motor-car wheels that is made up of a series of steel blocks, similar to the rubber blocks in the ordinary block-tire construction and with the ends cut off at an angle to eliminate bumps at the intersections, has been placed on the market. The blocks are cast hollow and mounted on a thick rubber pad which covers the outer edge of the wheel, thus causing all shocks to be transmitted through the blocks to the rubber and absorbed. For the purpose of taking up slight shocks a pair of springs is also placed in the hollow of each block and arranged so as to operate against a plate that rests upon the rubber pad. The tire is held in position on the wheel by a pair of flanged rings bolted to the rim of the wheel.

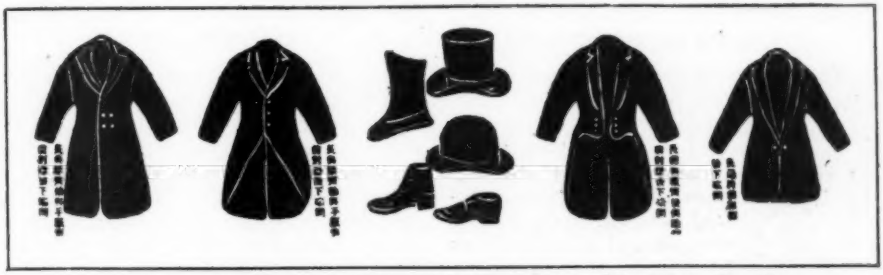
SEEDING IN GEOMETRICAL DESIGNS

A new method of planting seeds has just been invented which is very interesting on account of the perfectly regular geometrical figures in which it will plant single seeds. Such a machine should be of great advantage to gardeners and particularly to florists. The special machine illustrated is designed to plant the seeds either in squares or in triangles, though it could easily be



Seeding Machine Plants in Geometrical Figures

modified to plant them in circles, hexagons, rectangles, or any other desired forms.



The Modern European Clothes Prescribed by the President of the Chinese Republic

THE CHINESE "MODERN-CLOTHES" EDICT

Here, graphically portrayed, is a part of the edict in which the President of the new Chinese Republic prescribed European dress and etiquette for Chinese officialdom. Coats, hats and shoes for morning, afternoon and evening wear are shown, the illustrations representing the Chinese idea of fashionable European costume for men.

STEEL SLEEPING CARS WELL VENTILATED

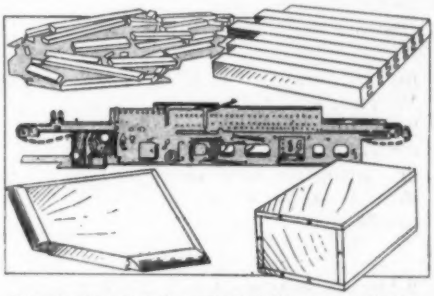
Travelers notice the absence of upper windows and decks in the rounded roofs of some modern steel sleeping cars. Recent tests show these contain more and purer air than the wooden type. The average supply of air for 36 steel cars was 53,000 cu. ft. an hour. The cars were entirely closed. The wooden cars with upper windows averaged 40,600 cu. ft. per hour. The carbon dioxide per 10,000 air volumes was only 7.32 volumes for the steel, but 15.90 for the wooden cars.

UTILIZING WASTE WOOD FOR BOXES

A machine which takes the cut-off ends and edgings that are usually sold for kindling wood by woodworking plants and shapes it into boards available for boxes, cores for all kinds of veneered and cloth-covered products, and the like, is being marketed by a Canadian concern. The machine does the work of jointing, gluing and uniting automatically, the procedure being as follows:

Two waste boards of random widths are fed into opposite ends of the machine. In one operation the dovetail is cut, the glue spread and the pieces forced together, making a completed joint. Then this piece is passed back through the machine and another board is jointed to it, the operation being repeated until a panel several inches wider than the desired width is obtained. The operator then rips it to size and the edging is returned to the machine to be jointed up to another piece.

The cost of making wide boards out of these narrow strips varies from 50 cents to $1.25 per thousand board feet, according to the different conditions. The box manufacturer using such a machine can buy waste lumber from mills and convert it into one-piece

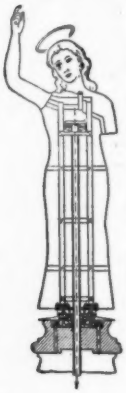


The Machine that Converts Mill Waste into Usable Boards, and Examples of Its Work

ends, sides, tops and bottoms. The cheaper product thus obtained is claimed to be far superior to the ordinary box.

CAMPANILE STATUE NOW UPON BALL BEARINGS

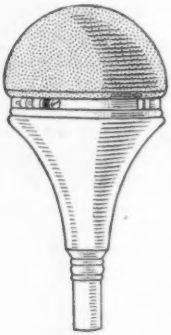
The imposing copper statue, which stood upon the top of the famous Campanile of St. Marks in Venice before that structure collapsed in 1902, has been restored to its original position upon the reconstructed church tower by providing the image with an interior vertical shaft. By means of ball-bearing devices at the top of the shaft and between the pedestal and the figure the latter is enabled to turn freely in any direction and better withstand the pressure of high winds, and shocks arising from earthquakes.



The shaft is also provided with a counterweight of 2,800 lb., the purpose of which is to bring the center of gravity of the whole below the pedestal.

RUBBER-CAPPED AUTO-HORN BULB

An automobile-horn bulb, the lower portion of which is in the form of a metal funnel, surmounted by a seamless rubber cap, is being marketed by a London concern. When one cap wears out, another may be substituted in its place by simply unscrewing the band clip.



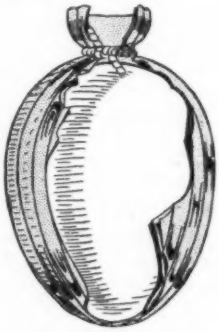
¶The Woman's National Fire Prevention Association was incorporated in New York recently. The purpose of the organization is to encourage the housewives to avoid fire hazards by awarding prizes to those who keep clean, rubbishless homes.

GASOLINE AND KEROSENE AS MOTOR FUEL

An automobile owner uses gasoline and kerosene for his motor by pouring these liquids in proportions of 5 gal. of the former to 1 gal. of kerosene into the same tank and allowing them to mix. The car which has been using this fuel was run a distance of more than 3,000 miles and its motor was apparently as clean after this test as before the fuel mixture was tried.

SAFETY EGG HOLDER MADE FROM PAPER

This egg holder is made from corrugated strawboard, the egg being inserted by opening an overlapping joint at the side. The container is provided with a small hole at each end so that it may be opened and closed without tearing it. The holder is adapted for sending eggs safely by parcel post, or carrying them with the least possibility of breakage.



A DUTCH ADVICE-GIVING INSTITUTION

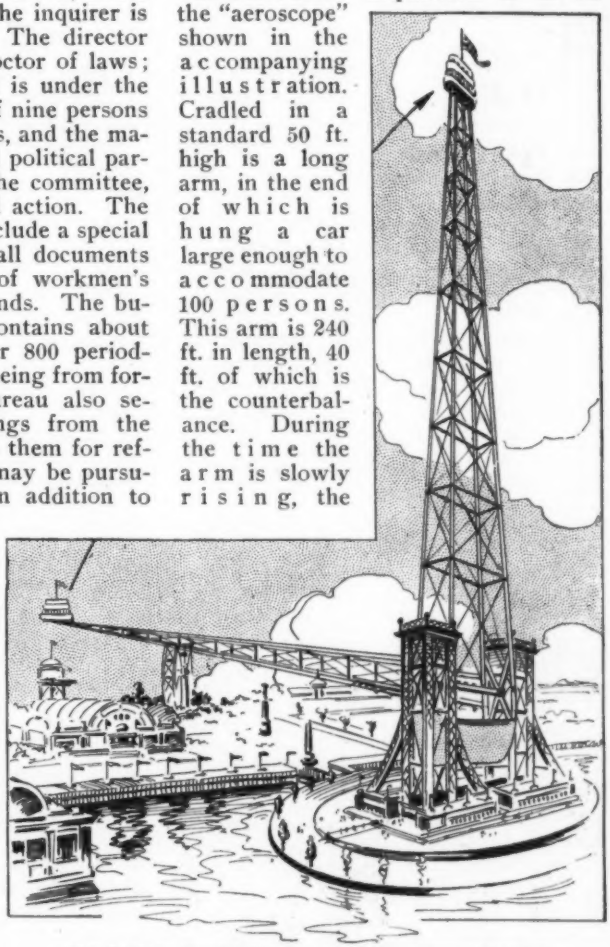
An organization, called the Central Bureau of Social Advice, has been established in Amsterdam, Holland, for the purpose of giving free to regular subscribers, mostly workmen, information regarding various subjects which usually only could be obtained at considerable trouble or expense by the subscribers themselves. The organization, which was suggested by the evident need of workmen for some place where they could go for reliable advice, has three definite objects, as follows: to supply information con-

cerning institutions and regulations in the interest of workmen; to collect and assort data for that purpose, and to collect material for a library. Information is given not only to subscribers, but to all others who ask for it, and a fee is demanded unless the inquirer is without means to pay. The director of the institution is a doctor of laws; the general management is under the control of a committee of nine persons elected by the subscribers, and the majority of all religious and political parties are represented in the committee, so as to secure impartial action. The sources of information include a special committee that collects all documents relating to the history of workmen's societies in the Netherlands. The bureau's library already contains about 13,000 volumes and over 800 periodicals, many of the latter being from foreign countries. The bureau also selects appropriate clippings from the newspapers and catalogs them for reference by patrons who may be pursuing special subjects. In addition to constant requests from subscribers the bureau has also received requests from other private individuals, industrial concerns, insurance companies, employers' associations, labor bureaus, and foreign governments.

The advice-giving institution began business with about 150 members and this number has since increased to about 700. The permanent members are each required to pay two dollars a year, or a sum not less than $40 at one time, and special rates are given to workmen's societies, the rates being about 40 cents for each 100 members. The total number of subscriptions at this time amount to about $2,000, while the state gives $1,400 annually, and several towns an aggregate sum of about $800.

THE "LIFTING ARM" OF THE PANAMA EXPOSITION

One of the most prominent or "looming" amusement features of the Panama-Pacific Exposition is to be the "aeroscope" shown in the accompanying illustration. Cradled in a standard 50 ft. high is a long arm, in the end of which is hung a car large enough to accommodate 100 persons. This arm is 240 ft. in length, 40 ft. of which is the counterbalance. During the time the arm is slowly rising, the standard, which rests on a circular rack on a concrete foundation, is revolved, affording the passengers a view of the grounds in every direction.



This "Lifting Arm" will be One of the Amusement Features of the Panama-Pacific Exposition

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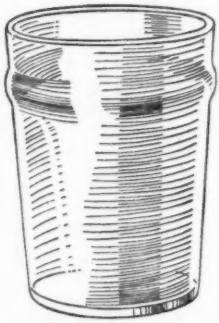
¶A frozen solution of salt, called "minus ice," is being used in Russia for preserving perishable articles in transit.

PRACTICAL AND NOVEL DEVICES OF MANY VARIETIES

One of the latest novelties for woman's use is an interchangeable toothbrush, to the handle of which a new brush may be attached when the bristles become worn, instead of throwing away the handle. The brushes are attached by simply pressing them firmly into the space provided for their insertion.

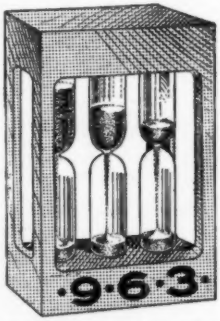
An Interchangeable Toothbrush

A new type of tumbler has a bulge near the top that prevents the edge of the glass from breaking or chipping when the tumbler is upset, or a number of them are grouped closely together. The bulge also affords a firm grip when removing the glass in one hand from the table, and therefore materially lessens the danger of breakage from dropping.


The Bulging Ring Prevents Chipping

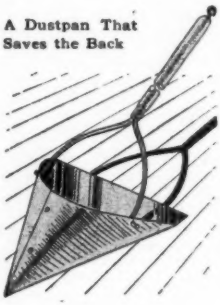
A Wrist Watch of Odd Design

A progressive jeweler of Germany is catering to the craze for wrist watches by originating a number of new designs, an elongated octagon being one of the most popular. The wristband of this distinctive type is made to order from either metal, leather, fabric, or any other suitable material.



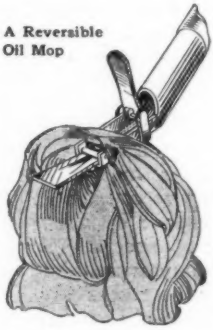
Hourglasses for Measuring Phone Talk

A Dustpan That Saves the Back



Although the hourglass is supposed to be no longer used for measuring time, a French telephone company has installed a device consisting of three hourglasses in its public telephone booths, for the purpose of indicating the exact length of a conversation. The sand runs to the bottom of the glasses in three, six and nine minutes, respectively.

A Reversible Oil Mop



A long handle is attached to a new dustpan in such a manner that the user does not have to stoop over when collecting the sweepings from the floor, and the contents cannot fall out when the pan is raised. The pan is made of steel and the handle of wood.

Safety Handle for Handbags

An oil mop that absorbs dust without scattering it is so constructed that, by simply removing the handle and reversing the mop, one can turn a clean side out and have practically a fresh mop. The handle

"Next Dose" Medicine Indicator

of the mop is released by pulling up a small lever.

A "handcuff" safety handle for women's handbags hitches the wearer to her valuables, gives her the free use of both hands, prevents the bag from being lost and assists in thwarting purse snatchers. The handle is adjustable to any bag.

Toaster That Can't Burn the Fingers

Sewing Clamp and Skirt Gauge

A very handy device for the sick-room is an indicator showing when the next dose of medicine should be taken. The dial is mounted upon a wire attaching to the cork of the bottle so that the indicator is always in sight.

Clothes Drier That Hangs from Ceiling

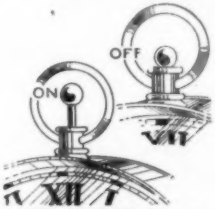
An improved bread toaster is operated by the thumb, and the bread is held by spring pressure until released. The device has no sliding rings to burn the fingers, like the old-style toasters, and the handle is made of wood.

Safety Seat for Window Cleaning

A new sewing clamp and skirt gauge holds the material while sewing, mending, ripping, embroidering, ironing, steaming, etc., and leaves both hands free to work with. The device is made of nickelplated steel and may be carried in the purse or handbag.

Easily Repaired Poultry Fountain

A novel wooden clothes drier is attached by a rope to a hook in the ceiling on the porch or in the house. After the clothes are hung on the arms the drier is drawn up to the ceiling by the rope and let down the same way. The device folds close like an umbrella when not in use and holds a good-sized washing or ironing.



Stem Cut-Off for Alarm Clocks

A safety window-cleaning seat for women makes window cleaning safe and easy work, as the seat is quickly and securely attached to any ordinary window sill and cannot be detached until the weight of the body has been removed.

Shoe Scraper That Cleans Thoroughly

A drinking-fountain pan for supplying fresh, clean water to fowls and small animals consists of a steel pan in the center of which is fastened the cover of an ordinary Mason fruit jar, to which may be screwed a glass jar filled with water, the whole being then inverted. The advantage of this watering device is that broken jars may be readily and cheaply replaced.

Electric Flatiron That will Not Overheat

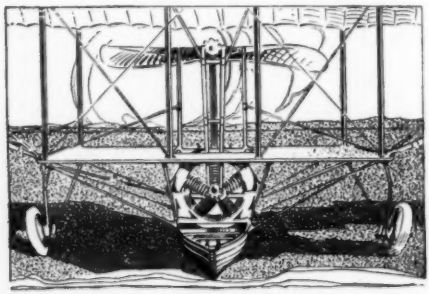
A new type of alarm clock has a knob mounted on a stem, like the knob of a stem-winding watch. When it is desired that the alarm shall ring, the knob is pulled out, and pressing it in again shuts off the sound.

A novel shoe cleaner has not only a scraper bar for the sole of the shoe, but stiff brushes so mounted that they wipe the mud off the edges and the sides of the uppers at the same time.

Trouble caused by electric flatirons overheating is averted in a new type by an electrothermostat which operates to turn off the current when the desired temperature has been reached. It can be set for different temperatures.

HENRY FARMAN'S NEW HYDRO-AEROPLANE

The boat portion of Henry Farman's latest hydro-aeroplane has probably more the appearance of an ordinary



The Pontoon or Float of the New Farman Hydro-Aeroplane is Shaped Exactly Like an Ordinary Boat

water craft of the skiff or rowboat type than do the boat portions of other hydro-aeroplanes. Some of the hulls adopted resemble more or less those of motorboats of the hydroplane order, to be sure, but would create a queer impression if seen floating in the water with the aeroplane upper works removed, while the hull of the Farman machine might easily pass as an ordinary boat.

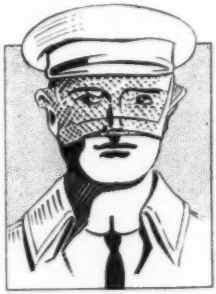
THE VELOCITY OF THE GULF STREAM

The Gulf Stream, which courses along the northern coast of South America, through the Caribbean Sea, into and around the Gulf of Mexico, emerges into the Atlantic Ocean between Key West and Cuba. When it passes the Peninsula of Yucatan into the Gulf of Mexico, its velocity is one-fourth of a mile per hour, its width 90 miles, and its depth about 6,000 ft. It passes into the Atlantic at Key West at a speed of from four to five miles an hour, this high velocity being due to its crowding through a narrow and shallow channel. The width of the stream at this point is 50 miles and its depth but 2,100 ft. As it passes through the North Atlantic its velocity decreases rapidly, and off the banks of Newfoundland is less than half what it was when it passed the Straits of Florida.

It is estimated that the Gulf Stream carries daily along the Florida coast the enormous quantity of 436,000,000,000,000 tons of water.

SANITARY FACE SHIELD FOR MOTORISTS

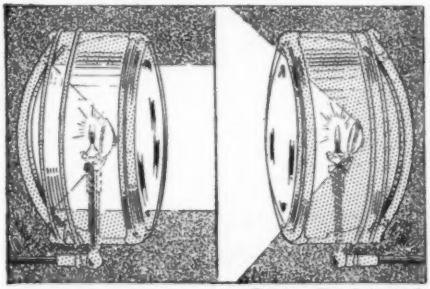
The interesting feature of this guard for the upper part of the motorist's face is the silk gauze, which protects the passages of the nose from inhalation of the particles of dust afloat in the air. The shield, which is light and flexible, folds up and is carried in a leather case when not in use.



¶The total production of wild and plantation rubber throughout the world in the 12 months ending June 30, 1912, amounted to 93,669 tons, as compared with 79,026 tons in 1909-10.

LAMP REFLECTOR THAT KILLS GLARE ON ROAD

A new type of searchlight for automobiles which by an ingenious use of two reflectors can be made either to throw a strong and sharply defined light straight forward only, or to illuminate all the ground in front and to the sides with a soft glareless light, that will not dazzle the driver of an approaching vehicle, has been designed by a foreign inventor. The two reflectors, which are of unequal size, are normally placed one on either side of the lamp, in which case, as shown in the diagram, a strong light of practically parallel rays that illuminates only the road straight ahead is produced. When, on the other hand, it is desired



Courtesy The Automobile

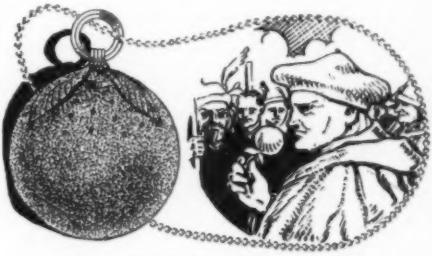
Reflectors Adjusted to Throw Rays over Road Just Ahead of Vehicle — Reflectors Arranged to Diffuse Rays of Light over a Large Area

to light the sides of the road, as at a turn, or to soften the glare of the lamp, the smaller reflector is swung around to a position back of the lamp, by means of a wire connected to the driver's seat, where it cuts off all the light from the large reflector and sends it in diverging rays over a large area in front and to the sides of the vehicle. Different effects may be obtained by having the axes of the reflectors parallel or slightly converging, thus causing the rays to overlap and throw a very strong light into the middle of the road.

¶Two dredges with dipper handles, 62 ft. long, are cutting the entrance channel to the Panama Canal on the Atlantic side.

SCENT BALLS PATTERNED ON CARDINAL'S ORANGE

The scent ball here shown was designed to perpetuate the charming idea originated by Cardinal Wolsey, who,



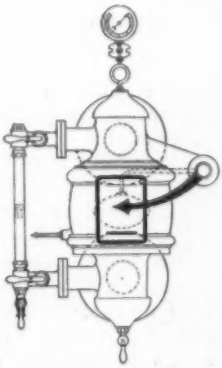
The Cardinal's Orange as a Scent Ball

whenever he was in a crowd or pestered with suitors, "most commonly held to his nose a very fair orange, whereof the meat or substance within was taken out and filled up again with the part of a sponge, wherein was vinegar and other confections against the pestilent air."

In this scent ball the perfume is allowed to escape or remain inclosed by simply turning the upper part.

ARROW HAND FOR ENGINE BOILER GAUGE

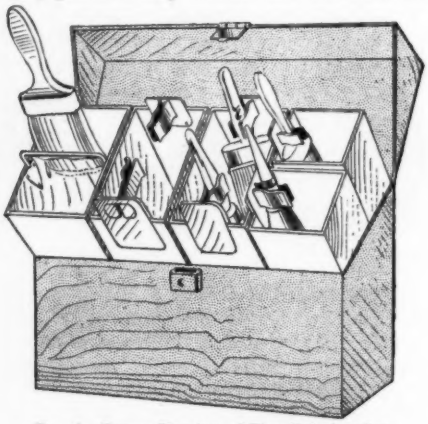
In order to make the indications of a sight gauge on the boiler of a stationary engine easily readable at a distance, a German firm has combined with such a gauge, a lever - operated arrowlike hand which automatically follows the rise and fall of the water in the glass tube. This index is painted black and moves in front of a



white-enameled plate attached to the gauge. It is operated by a float which actuates the lever mechanism.

SANITARY HOLDER FOR PAINTBRUSHES

To keep paintbrushes in good condition during the time they are not in use, particularly when the brushes in



For the Proper Keeping of Fine Paintbrushes

question are to be used in fine interior decoration work, is not a simple task, but one which is aided materially by such a brush keeper as is here shown. The five metal containers in this box make it possible to keep brushes used in different paints and varnishes separate, and the clips keep the brushes from coming in contact with the bottom and sides of the retainers.

A NEW POWER UNIT SUGGESTED

The adoption of a new power unit, called the "myriawatt" and intended to take the place of the unit "boiler horsepower," has been recommended in a report submitted by a committee of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers. The new unit is suggested as a simple and satisfactory method of rating the energy input of power-generating machinery in terms of the watt, the international power unit. By adopting the myriawatt as an input unit and stating the output in kilowatts, the efficiency of the power plant is easily calculated. The report also recommends that the terms myriawatt and myriawatt-hour be abbreviated to mw. and mw.-hr. in writing.

TRICKS OF COAL DEALERS TO GIVE SHORT WEIGHT

The New York State superintendent of weights and measures recently unearthed a tricky practice indulged in by some unscrupulous coal dealers to defraud their customers. The practice is to place a number of bags of coal on top of a bulk load and after obtaining the ticket required by law, indicating that the load is full weight, to deliver only the bulk load unless an inspector happens to be in the vicinity, when the extra bags are also delivered. Another fraud discovered in New York is perpetrated by placing a small partition under the seat of the wagon so that a few hundred pounds of coal in the front of the wagon will not be discharged when the body is tilted for dumping.

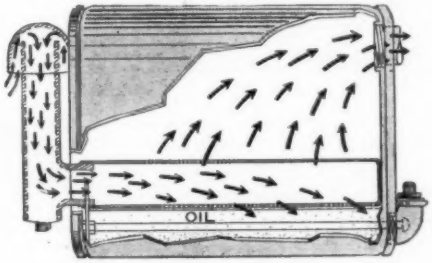
NEW SUBSTITUTE FOR TURNBUCKLE

A wire stretcher to be used in fastening guy ropes, and the like, and which for certain purposes may advantageously replace the turnbuckle, is shown herewith. It is made in one piece, of forged iron. The wedge, which holds the wire in the slotted slide, has grooved edges so that the wire cannot be cut or damaged, though at the same time it is held without possibility of slipping.

¶ An explosive fire-alarm device, in the form of a sealed can containing an explosive substance which will ignite through a fuse and give an explosive alarm when the fuse is heated to a certain temperature, has just been invented and patented.

SCREENLESS AIR CLEANERS

An air cleaner which is not a sieve, containing no screens to become clogged, is shown in the accompanying drawing. A sheet of oil is the purifier, catching the dirt particles as the air is passed over it. The dirty air enters a horizontal tube in the cleaner through the pipe shown at the left. In the bottom of this tube is a long, narrow slot through which the air is discharged against the oil which fills the bottom of the cleaner. The oil is not blown aside by the air, but is simply agitated sufficiently to cause the particles of dirt taken from the air to sink to the bottom of the tank, constantly exposing a clean surface of oil



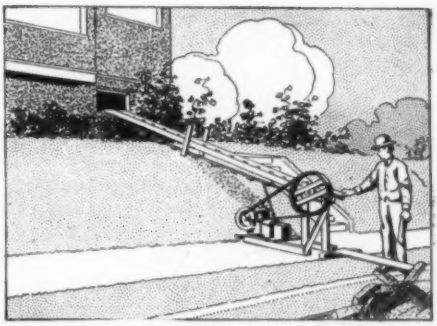
Air Cleaned by Contact with Oil

to the entering air. The air, thus robbed of its dirt particles by contact with the oil, then rises into what is called the expansion chamber of the cleaner and passes through a pipe to the carburetor, air compressor, or other device requiring pure air.

This air cleaner is being used in connection with automobile carburetors, and air-brake compressors on railroad locomotives and electric cars.

INGENIOUS HOMEMADE ENDLESS CONVEYOR

The owner of a home in Portland, Ore., having a high, terraced lawn, constructed an ingenious endless carrier for the delivery of wood from the street to the basement of the house. The conveyor is driven by a 3-hp. gasoline engine. Besides saving the lawn

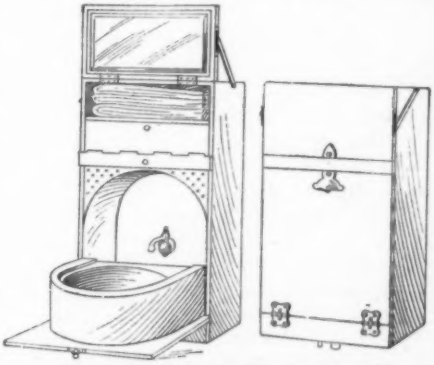


A Gasoline-Driven Conveyor Rigged Up to Handle Wood from the Street to the Basement

and terrace from being trampled and torn up, the conveyor enables him to store away 16 cords of wood in the time it previously took to handle eight cords.

FOLDING LAVATORY FOR AUTOMOBILES

A complete lavatory equipment for automobiles of the limousine type, which, when folded out of the way, takes up but little space, has been placed on the market recently. When opened, it provides a washbasin, with running water, and has a compartment for combs, brushes, and the like, and a shelf for towels. The hinged panel of the towel compartment, which is swung upward when the lavatory is in use, has a mirror on its inner side.

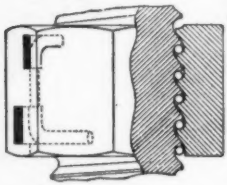


An Ingenious Folding Lavatory for Automobiles

The water for the lavatory is carried in a tank on the top of the car.

BALL-BEARING SCREWBOLTS AND NUTS

A new application of ball bearings has been brought out recently by a Parisian firm of machinists. As shown in the sketch small steel balls are laid in between those surfaces of the screw and nut which are not in contact, but if it is desired to work the screw in both directions, both sides of the thread have balls. The nut is provided with a channel, into which the balls fall before they reach the upper side of the nut, being thus conveyed to its lowest thread and insuring that the surfaces of the threads not in contact are constantly provided with balls.



It is, of course, necessary to have means of securely fastening the nut, since the small amount of friction in the threads would otherwise allow it to become loosened easily. For bolts of larger dimensions and subjected to great strains this innovation is expected to prove valuable, while for lighter work and smaller sizes the naturally higher price would preclude their use.

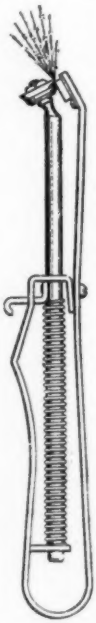
FROM THE UPPER AMAZON TO THE PACIFIC BY RAIL

A tremendous railroad undertaking, the final link to connect the headwaters of the Amazon with the Pacific Ocean, making it possible for shipments of rubber, hard woods and hundreds of tropical products from tne Upper Amazon region to reach the United States by way of the port of Callao and the Panama Canal, has been commenced in Peru. The length of this link, which is known as the Amazon-Pacific, is only 250 miles, but, with its eastern end at the river port of Pucalpa, it will climb the eastern slope of the Andes, to connect with the wonderful Oroya railway, which climbs the western slope and reaches the greatest height known to railroading. The lines of the Oroya railroad reach the summit of the mountains, but then extend north and south, no attempts having been made to descend the eastern slopes.

Steamers of 2,000-ton burden will ply between Pucalpa and Iquitos, a Peruvian city of great commercial importance 2,000 miles from the mouth of the Amazon, to which ocean steamers are already running regularly. To Peru, the new railroad will mean the exchange of eastern and western products within three or four days' time instead of six months. It is expected that the road will be completed by the time the Panama Canal is officially opened.

NEW IGNITER THROWS SPARKS OUTWARD

This new form of igniter throws the spark directly outward from the end. A loose ring of sharpened steel, mounted upon the end of the spring-encircled rod, is driven against the ignition block when the spring is released, projecting the stream of sparks forward. The steel striker, being loosely mounted, is turned slightly with each operation, and therefore the wear is distributed around its entire edge.



YEAR RINGS IN A LEAD PIPE

An underground lead water pipe, which presented a very peculiar form of corrosion was encountered recently during repair work on the water system in a German city. The wall of the pipe was corroded for about four-fifths of its thickness, and the attacked part was found to consist of 48 alternate layers, red and yellow, of two dif-

ferent combinations of oxygen and lead. This, together with the fact that the pipe had been underground for 24 years, led scientists to presume that two layers had been formed each year, one during the warm and another during the cold season.

Of practical interest is that the corroded part of the pipe had been imbedded in cement and that the remaining part, without such protection, was found in sound condition. This would naturally suggest that, when pipe is laid in cement, precautions should be taken to prevent moisture from collecting between the pipe and the cement, such, for instance, as some kind of moisture-proof insulation.

STREAMLINE FUEL TANKS FOR AEROPLANES

Streamline fuel and lubricating-oil tanks for aeroplanes, made of aluminum or brass, soldered, clinched and welded, were shown at a recent aeroplane exhibit. These tanks are made with lips at each end for attachment to the framework of the aeroplane. They

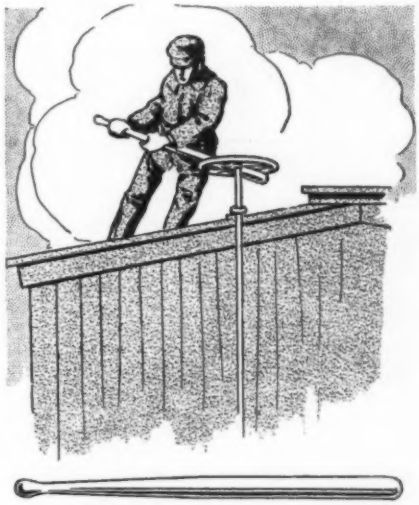
A Seamless, Streamline Fuel Tank

are likewise provided with special caps which are said to make them proof against danger of explosion.

RAILROAD ADOPTS STANDARD BRAKE CLUB

The use of a brake club, which is the name given any stout stick used as a lever in setting the hand brakes on freight cars, was formerly forbidden, because brakemen frequently became too enthusiastic in its use, and would set a brake so tight that the wheels would slide, a procedure which soon ruined the wheels.

With the steadily increasing use of heavy cars, however, the freight brakeman has found the brake club increasingly necessary, and the Pennsylvania Railroad is now furnishing its brake-

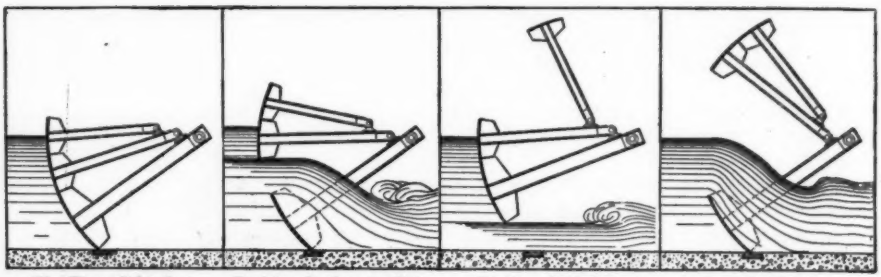


Flawless, Split-Hickory Brake Clubs

men with standard clubs, 28 in. in length, very similar to baseball bats and made of selected, straight-grained, split hickory, entirely free from knots, splits, and like imperfections. The use of stray sticks, picked up at random, is prohibited as risky, as such sticks are liable to break, endangering the life of the user.

BRUSH COIN CUSHION

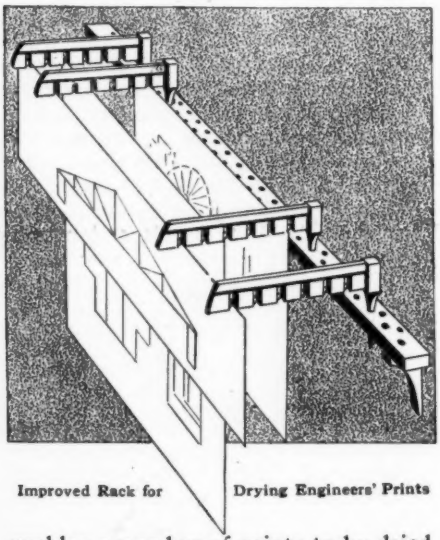
A brush to take the place of the rubber mat on the cashier's window in stores is a practical novelty recently introduced in Paris. It is easy to pick up coins from such a base, even with gloved fingers, and, should the customer desire, he or she may clean the coins by rubbing them over the bristles.



The Three-Part Gate Closed — Position for Intermediate Flow — Position for Waste Underflow — Gate Raised for Overflow

PHOTO-DRYING RACK FOR ENGINEERS

A convenient device for drying engineers' prints by suspending them from the self-retaining jaws of a rack has been put on the market. The construction of the rack is such that the insertion of the print into the clip will hold it securely in position and a touch of the finger will release it. The device occupies but small space and



Improved Rack for Drying Engineers' Prints

enables a number of prints to be dried at the same time without creasing or wrinkling.

¶The number of horses in the U. S. increased from 13,500,000, in 1900, to 21,040,000, in 1910, in spite of the rapid development of the automobile.

THREE-PART CONTROL OF WATER FLOW

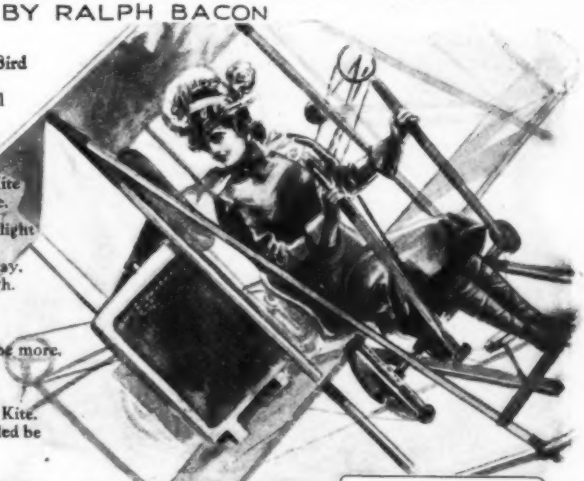
The operation of this three-part water gate, designed for the control of division dams, main canals and irrigation ditches, and for the control of a reservoir level on the crest of spillways, is clearly indicated in the drawings. They show the gate closed to completely check the flow of water; the two upper sections raised to allow an intermediate flow, the second section keeping surface trash from passing, and the lower section preventing the passing through of heavy gravel on the stream bed; the upper gate section completely lifted, and the two lower sections raised to allow an underflow when it is desired to clear the bottom of waste, and the two upper sections completely raised to allow of a heavy overflow and yet prevent the passing of the heavy gravel on the stream bed.

CARS FOR INVALIDS ON GERMAN RAILWAYS

The German railroad system provides a specially designed car for invalids and cripples who can afford to use it. Every possible convenience for the sick is contained in the car, and a compartment, opening on the level of the station platform with a double door, so that a stretcher can be carried in without difficulty, is set apart for the invalid and attendants. The other section of the car contains a kitchen and a handsomely upholstered compartment for members of the family and accompanying friends.

THE BALLAD of BILLY BIRD

BY RALPH BACON



You never have heard how Billy Bird
Sailed the aerial sea?
Then the tale I'll tell of what befell
As the tale was told to me.

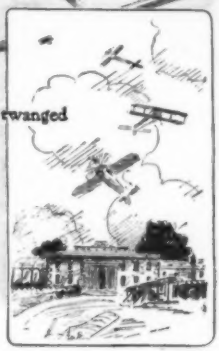
Oh, Billy B. was an airman free
As ever burned gasoline.
And he loved at sight Katherine Kite
Who rode in a Wright machine.

Now Katherine Kite had an eyrie light
Where the airmen loved to go,
For Katherine K. was pretty and gay,
And her father had lots of dough.

Oh, she gave one day a party gay
To airmen bold and free;
And there came ten score or maybe more,
From over the land and sea.

And every one, to the eagle's son,
Claimed the hand of Katherine Kite.
"Bold birds," quoth she, "I'll married be
Before the coming night.

Tank up with care from the hangars there
With papa's gasoline,
And I'll marry the man who proves he can
Follow his bride's machine."



Then her motors banged and her guy wires twanged
And Katherine Kite was gone!
Oh, they spattered the scene with gasoline,
Till the flock flew off the lawn.

But who is the swain in the monoplane
Who follows so close on the Wright?
It's Billy Bird of whom you've heard
With his tanks all full and tight.

Then Katie no doubt let her engines out,
Her engines two and three,
For she looked again for the flying men
And saw only Billy B.

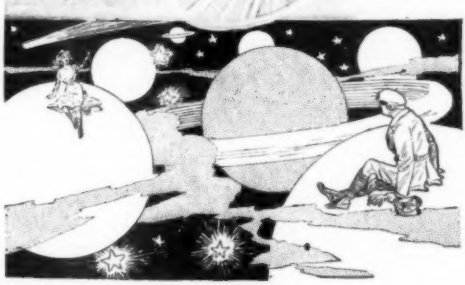
"Oh, Billy B. will you follow me
In the comet's fiery trail?"
"Oh, Katherine Kite, I'll follow your flight
If you tickle the Scorpion's tail."

Oh, lovers will brag but their engines lag
If they haven't got gasoline,
And Billy's are still, while Kate has a gill
To hold up her big machine.

It was none too soon she steered for a moon
Where Saturn's rings run round—
A long hard glide bold Billy must ride
If he lands on Katie's ground.

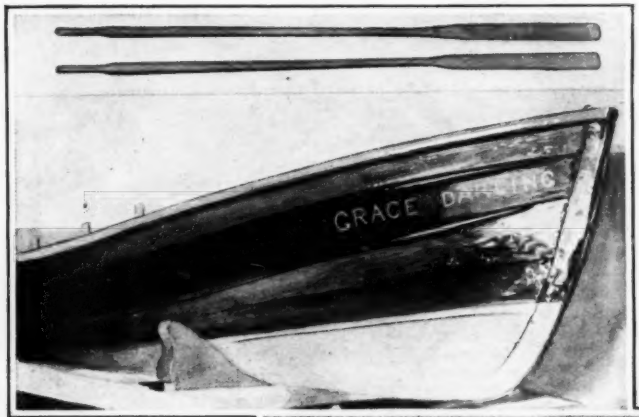
He slid too soon, for a nearer moon
Was the best that he could do!
By the seven-moon light of a ringed night
The Saturnese watch the two;

And there they must stay till the judgment day
Or the good gods intervene,
Each a broken heart—just a moon apart
For the want of gasoline!



GRACE DARLING'S BOAT NOW IN MUSEUM

The coble or rowboat, in which Grace Darling and her father, William Darling, rescued nine persons from the wreck of the steamer "Forfarshire" in 1838, has been presented by a resident of Newton Hall, Stockfield, England, to the Dove Marine Museum at Cullercoats, England.



Grace Darling's Boat Which Now Rests in the Dove Marine Museum of England

The removal of this famous boat to its present location calls to mind the daring exploit of Grace Darling, who, on the morning of September 7, 1838, in company with her father, the light keeper, embarked from the Longstone lighthouse on one of the Farne Islands, near the coast of Northumberland, and rowed more than a mile through boiling seas to the wrecked vessel, which lay broken upon one of the Farne Islands.

By wonderful strength and skill the two Darlings succeeded in reaching the wreck, from which they took the nine persons who still remained alive from a total of 63 people, and bore them safely to Longstone. The thrilling rescue, to which the elder Darling at first offered vigorous objection, made Grace Darling one of the greatest heroines of history, and the boat, together with a pair of her oars, have since been regarded as almost priceless possessions by the people of England.

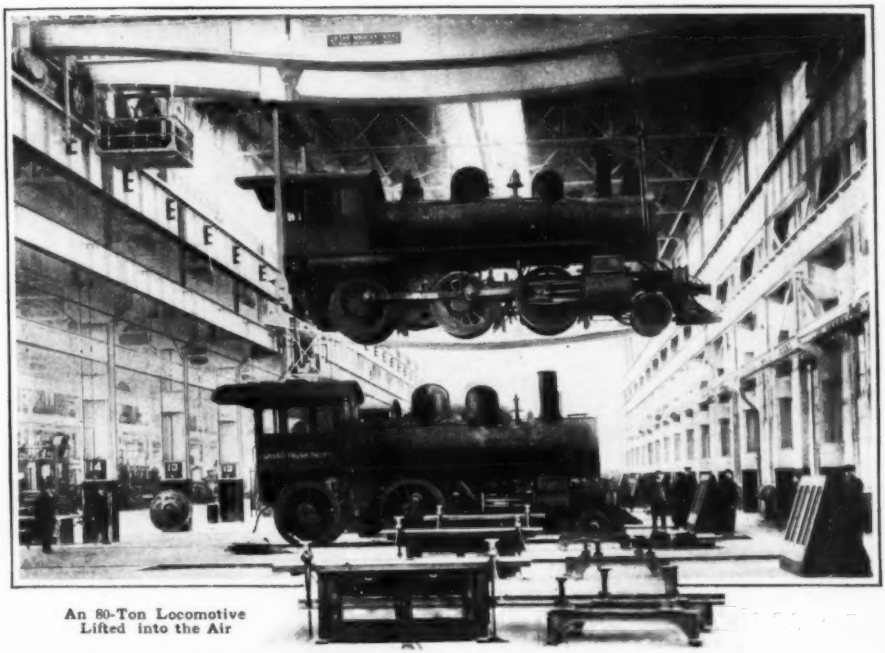
Courtesy Illus. London News

Grace Darling and Her Father Rowing to the Wreck

HOUSE-HEATING PLANT IN GARAGE

The heating plant of an Indiana residence is in a garage. Heat is conveyed to the house by an underground steam line surrounded by an almost impervious tile piping which prevents the loss of heat from radiation. The advantages of such a detached plant are that no coal dust and ashes will be present in the house and there will be no fire hazard from a furnace which is located in the cellar.

¶Artificial wood made of sawdust and magnesium chloride is used for flooring and interior woodwork generally.



An 80-Ton Locomotive Lifted into the Air

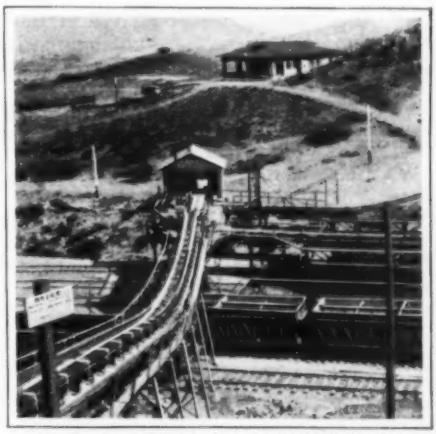
MOVING LOCOMOTIVES ABOUT IN THE AIR

In the locomotive repair shop of the Grand Trunk Pacific Railway at Transcona, which is just across the Red River from Winnipeg, is a 120-ton overhead crane which is used to lift locomotives into the air from one track, carry them over other locomotives and lower them to another track. The locomotive shown lifted into the air weighs 80 tons.

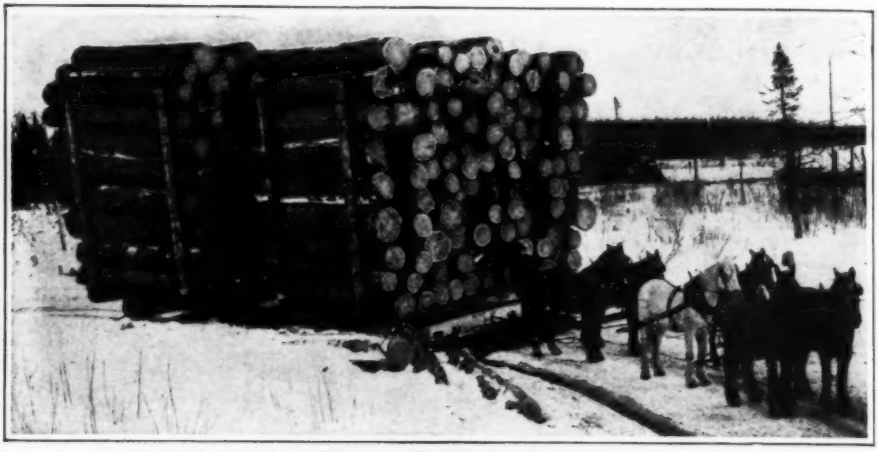
MACHINE MIXES UP ORES BY CARLOADS

At a large Arizona mine an ingenious device is being operated which saves time, work and money in mixing ores for the smelter. In this mine the various shafts and levels yield ores of different qualities, which when mixed in the right proportion give a good fluxing combination. Usually a machine for this purpose has to be installed, which is very expensive.

In this case the ore is hoisted from the mine in automatic electrically operated dumping skips, depositing the ore on a belt conveyor which leads from the shaft of the mine to a trestle constructed over the railroad tracks. The ore cars are run under this trestle, and a small engine to which the belt



Ore Conveyor Which Automatically Makes Up Carload Mixture of Various Quality Ores



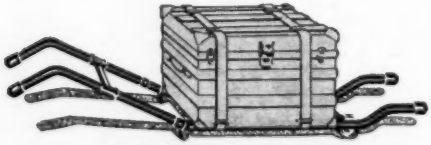
A Load of 200 Logs Weighing 177 Tons, Hauled 15 Miles by Six Horses

conveyor is attached runs up and down the trestle and dumps a layer of ore in each car. When the proper amount of mineral from one level has been deposited in the car, ore from another shaft is in the same manner conveyed to the car, and so on, until the right proportion of each is used. Thus the ore is handled fewer times than in the mixing machine, and it is in the cars, ready for delivery at the smelter.

FOLDING BAGGAGE TRUCK FOR HOTELS

A truck for the handling of trunks and other baggage, especially designed for use on the upper floors of hotels, is so constructed that, when not in use,

The Truck with Handles Folded Back over Body



The Truck Opened Out for Use

the handles fold over the body of the truck, which is mounted on small, rubber-tired wheels, to prevent wear on hall carpets.

SIX HORSES HAUL LOAD OF 177 TONS

One ton to a horse is considered a fair wagon load, but when it is a question of runners instead of wheels, the proportion goes up by leaps and bounds. Even the load that can be carried over snow on runners has a limit, however, and it would seem that 29 tons to the horse would be far beyond it, were not evidence to the contrary at hand. This load of 200 logs, estimated by the U. S. Forest service to weigh 177 tons, was hauled from Pine Island, Minn., to the railroad shipping point, 15 miles distant, by six horses.

PHOTOGRAPHS ON BOTH SIDES OF PAPER

A photographic paper having the sensitive emulsion on both surfaces of the sheet and so treated that photographs can be made on both sides without the one interfering in any way with the other has been invented for use in making photographic copies of documents and public records. The double-surface paper thus reduces the volume of public record books in states that have passed laws permitting the photographic process for recording deeds.

DANUBE'S LARGEST BRIDGE GUARDED BY POLICE

The great Danube railway bridge between Feteschti and Chernavoda, in Roumania, which structure is nearly 10 miles long, has been placed under a strict military guard in order that no successful attempt may be made to damage the structure by passengers in the trains crossing it. Every carriage of each train carries two Roumanian policemen whose duty is to prevent the windows from being opened and a bomb dropped on the bridge by some Bulgarian, and several torpedo boats are constantly on duty to forestall any attempt to injure the pillars. These extraordinary precautions are being taken because this bridge would play a very important part in case war should be declared between Roumania and Bulgaria.

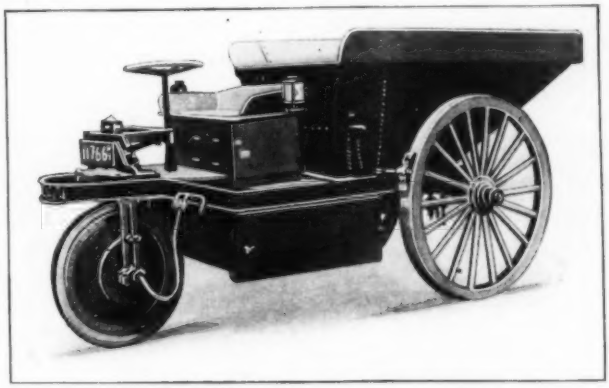
LIGHTER ARMOR POSSIBLE FOR WARSHIPS

An English engineer has developed a method of increasing the resistance of armor plate while reducing its weight. The method provides modifications of the whole process of making armor plate, from the ingot to the finished product. The ordinary armor plate has hardened surfaces, front and back, and a soft core. The new armor consists of a number of plates hardened separately and bonded together, the core containing layers of steel as hard as the surface. In heavy plate, the saving in thickness is claimed to be 20 per cent.

An 8-in. plate made in this manner is said to have resisted a 14-in. shell, which would have pierced ordinary armor plate of the same thickness.

THREE-WHEELED ELECTRIC REFUSE CART

A rather unusual electrically driven dump cart has been constructed by the Third Avenue Railway in New York for the handling of refuse from underground trolley conduits where overhead trolley wires are not permitted. The cart has a two-ton steel body balanced to dump backward. The drive is applied to the front wheel, within which is a 3-hp. direct-current motor, receiving power from storage batteries placed in a box hung from the channel-iron frame just back of the wheel. The wires from the battery reach the motor through a hole in the center of one of the axle stubs.



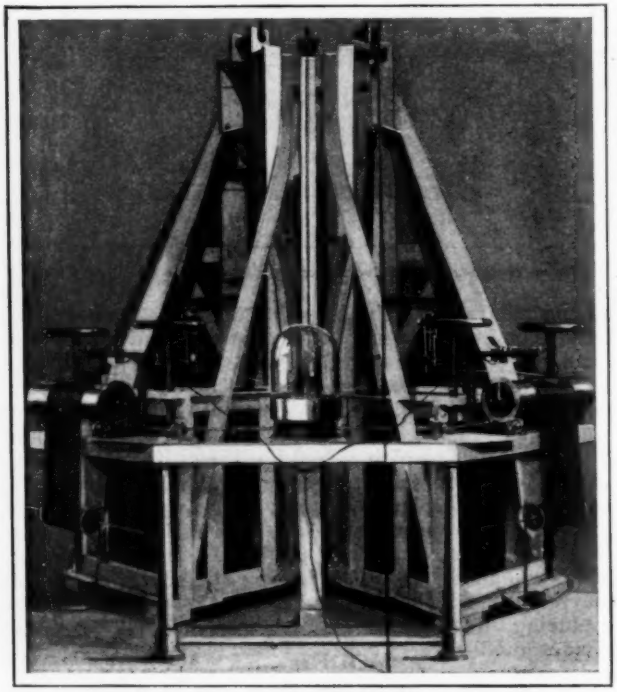
Three-Wheeled, Front-Drive Electric Dump Cart for Handling Refuse

A MODEL GERMAN FACTORY

A German firm that manufactures optical goods on a large scale has established for its employes a "Volkshaus," or people's house, which contains a well-equipped library, reading rooms, a literary museum, a museum of physics, a school of arts and crafts, an assembly hall capable of seating 1,500 people, a smaller hall for lectures, an art collection, music room, etc. The Volkshaus is available to all the people of the city in which it is located and has proved to be an important educational factor.

LARGEST SEISMOGRAPH IN AMERICA

The largest seismograph in America was recently presented to the American Museum of Natural History, New York. This device records earthquakes occurring in any part of the world, by utilizing the inertia of heavy weights suspended from a rigid metal frame, which in turn is supported by concrete piers anchored to solid rock. Any tremor of the earth causes a slight motion of the frame relative to the suspended masses and this motion is recorded by a delicate point on a moving strip of smoked paper.



Largest Device for Recording Earthquakes

¶Loading coal upon a vessel from cars at the rate of 7,473 tons in 3¾ hours, or 1,993 tons per hour, was a feat recently accomplished at Baltimore by employes of the Baltimore and Ohio Railroad Company.

SAFETY OF MONOPLANE AS GREAT AS BIPLANE

Several serious accidents to monoplanes in England recently resulted in an investigation by the War Office to determine the relative structural strength of this type of machine as compared with the biplane. The report of the committee finds the monoplane to be as safe as the biplane. The accidents investigated, according to the report, were not primarily due to causes dependent on the fact that the machines were monoplanes. Dealing with the question of the relative structural strength of monoplanes and biplanes, the opinion is given that it is quite possible to construct a monoplane so that it shall have adequate strength, and that, as concerns stability, there is no reason to conclude that the monoplane, as such, is less stable than the biplane. The final judgment was that there is no reason to condemn the use of monoplanes, provided certain precautions be taken, some of which are applicable to both classes of aeroplane.

"The wings can and should be so designed as to have sufficient strength to resist drift without external bracing," said the committee, "and in view of the grave consequences which may follow fracture of any part of the engine, especially engines of the rotating type, means should be taken to assure that a slight damage to the engine will not wreck the machine. Structural parts, the breakage of which may involve total collapse of the aeroplane, should, as far as possible, be kept clear of the engine."

An Unusually Complete Wreck on an Indian Railway

INDIAN RAILWAY TRAIN RUNS AWAY ON GRADE

A chaotic wreck occurred recently on the Quetta line of the Indian Railways. A freight, or "goods" train, as they are called in English railroading, was ascending the historic Bolan Pass. Something happened to one of the engines and the train had to be stopped. While the repair was being made the braking system let go and the train started down grade, steadily gaining momentum until, at a speed of some 80 miles an hour, it crashed into a siding. The engines burrowed into the earth, and car was piled upon car.

WATER WELL FURNISHES GAS TO PUMP ITSELF

The well used by an irrigation company in the famous Whittier district, in California, is unique in that it provides the fuel required for its own pumping. The water is permeated with natural gas, which, given off when the water commences to flow, is caught in a hood and piped to the gas engine. In starting, the engine is operated for a few minutes on distillate, but the natural gas soon comes in sufficient quantities to do the work.

This Water Well Gives Off Sufficient Natural Gas to Run the Pumping Engine

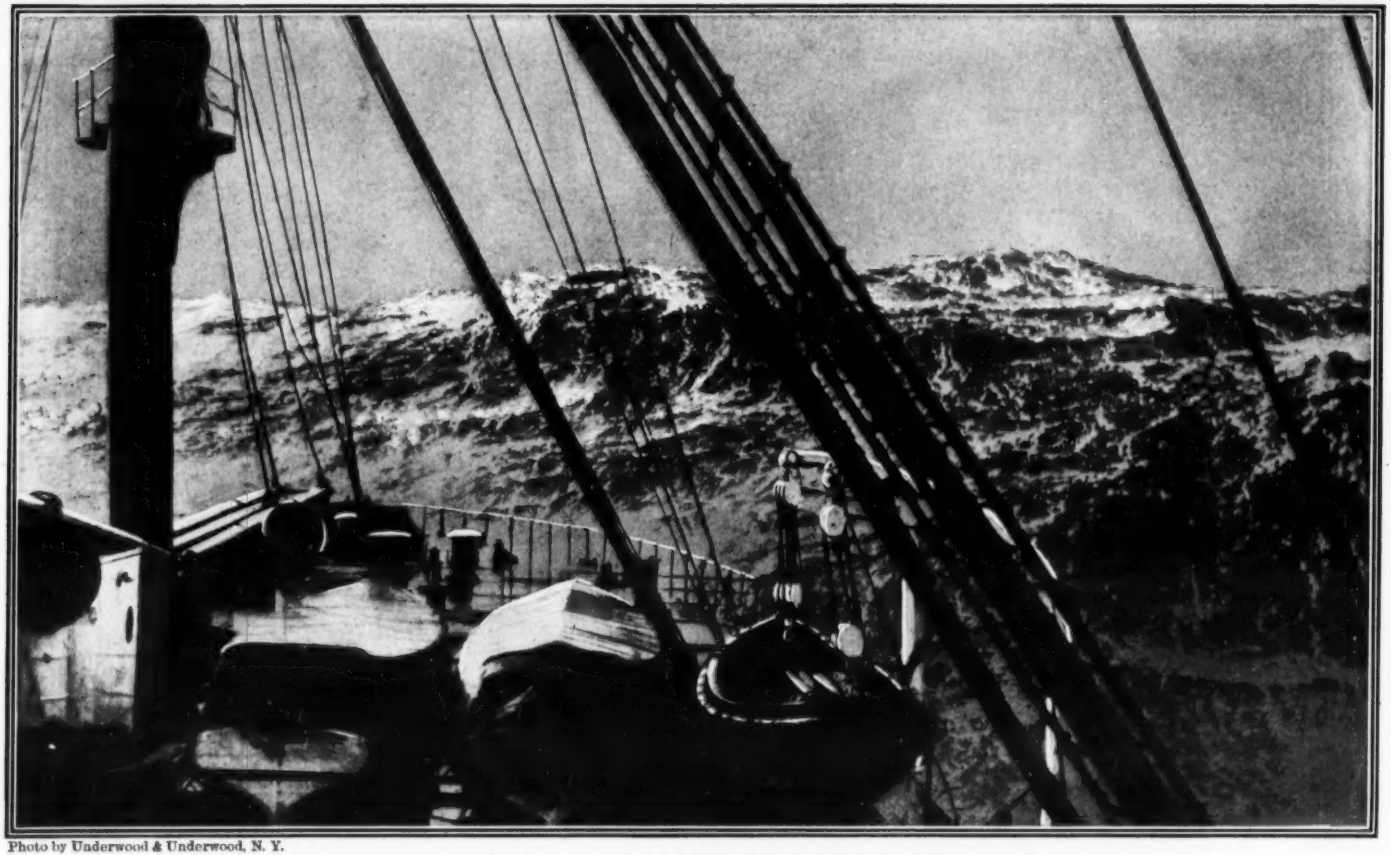


Photo by Underwood & Underwood, N. Y.

When Seafarers Tell of Waves Running "Mountain High" Landsmen are Often Incredulous, but Here is the Proof in This Photograph of a Huge Wave, Taken from the Bridge of an Atlantic Liner

SOME REMARKABLE MOTOR-FUEL TESTS

In order to secure a cheaper and more satisfactory fuel for motor-car engines a number of remarkable tests recently conducted in France have demonstrated that naphthaline, which formerly could not be employed to good advantage on account of the difficulty of quickly reducing it to a liquid state, can now be used for operating all motors designed for gasoline, paraffin, or ordinary gas.

The use of naphthaline in motor-car engines is made possible by fitting the tank containing it with a system of pipes through which are conducted the hot exhaust gases from a specially constructed carburetor, thus melting the naphthaline. This carburetor is connected to another carburetor that uses gasoline, as this liquid is employed for starting the engine to enable the naphthaline to be heated by the exhaust gases.

The number of tests indicated that the cost of running a car by using naphthaline, instead of oil and gasoline, was reduced 70 per cent on an average. It is also claimed that, by using crude naphthaline in the manner described, other advantages result: Production of power for small motors is reduced to less than two-fifths of a cent per horsepower-hour; no choking or clogging of engine parts, whether motor is running fast or slow; no danger of an explosion at any time.

¶A coal field that has been burning under ground for many years has been found in Germany. Shafts sunk to 18 ft. opened veins of blazing coal.

OFFICE BUILDING BUILT OF OYSTER SHELLS

Galveston has a five-story office building built of oyster shells; that is, it is constructed of concrete consisting of 1 part cement, 2 parts sand and 4 parts oyster shell. The oyster shells forming the coarse aggregate were taken from the reefs of Galveston Bay.

Large Galveston Office Building Constructed of Oyster-Shell Concrete

One of the oldest houses in the United States, erected in St. Augustine by the Spaniards in the 16th century, was constructed of a sort of plastic mortar composed largely of beach shells.

LETTER-PICKUP TABLE FOR POSTOFFICES

The government is installing in its larger postoffices a labor-saving device in the shape of an automatic letter-pickup table which is expected to increase the efficiency of the postal clerks engaged in this particular work at least 50 per cent. The table is 20 ft. long, 4½ ft. wide and is made entirely of steel. Eight clerks can work at this

table and all stand at one side, a few inches from which are various-sized slots leading to a number of endless

Automatic Letter-Pickup Table Used in Government Postoffices

belts beneath the table. When a sack of mail is emptied upon the table, the clerk takes the letter and, with the stamp facing himself, drops it into the proper slot. The belts carry the letters to one end of the table where they are automatically stacked and then put in the cancellation machine by another clerk. It has been found that the row of smaller slots is used most, as nine-tenths of the letters handled are of the regular-sized envelope.

METAL COATING FOR AUTO BODIES

The finishing of the exterior of automobile bodies with a metallic coating instead of with paint or varnish is receiving considerable attention in German automobile circles. The method of metalizing the surface with a hard, smooth and nonrusting coating is by means of a hot blast. The speed with which the fine particles of metal leave the spraying nozzle is about 5,000 ft. per second. When the spray strikes the surface to be coated the particles are not yet fully solidified, but, remaining plastic for a few moments, are welded into a perfectly homogeneous and adhering film under the high pressure of the stream. In the development of the process it is quite possible that coloring matter can be mixed in to obtain any tint desired.

CHINESE STILL PULL THE PLOW

Today the Chinese are tilling the soil in the same primitive fashion and with the same antiquated implements their forefathers used hundreds of years ago. The hire of men is so cheap that the Chinese farmer cannot afford to use modern horse-drawn plows, and would grudge the animals their provender. The two-man-power plow commonly used turns a furrow 6 in. wide. The men draw the plow about 15 miles in plowing an acre.

Men Still Draw the Plow in China

EXPERT CALLS THIS FINEST AMERICAN STREET

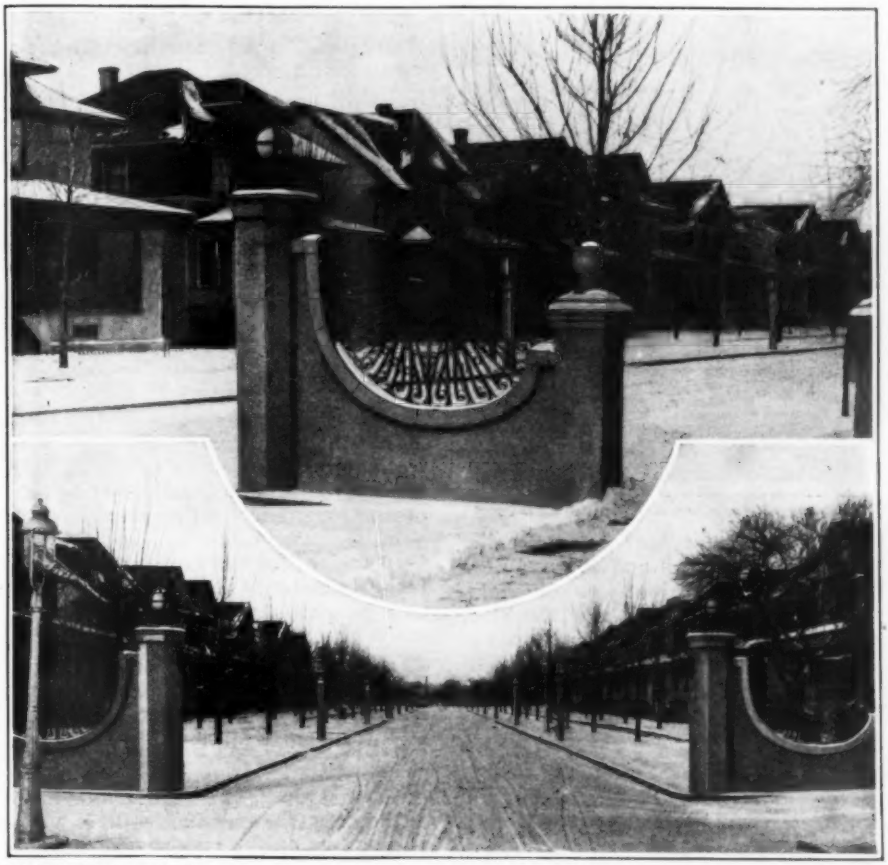


Photo by Chicago Daily News
This Chicago Street is Considered by Swedish Housing Expert to be the Best Model He has Found Anywhere

Residents in the little Chicago street here shown are proud of the fact that Adrian Molin, a Swedish expert on housing and living conditions sent on a world-wide tour of inspection by the government of that country, has declared in his report that this little street, which is three blocks in length, is a model that might well be copied. "Bernard Street," he declares, "is the finest street I have seen in America or in any other country. The points that entitle it to be thus designated are as follows: The location, for one thing, is ideal, the highway perfect, and the houses architecturally satisfactory and better lighted, better heated and more sanitary than any others I have found."

"QUITRENT" CEREMONY IN ENGLISH LAW COURT

A quaint ceremony takes place annually at the Law Courts in London, the City Solicitor appearing before the "King's Remembrancer" to discharge the quitrent service concerning certain properties in the city of London and the county of Salop. In this ceremony a block of wood, two

bundles of twigs, six horseshoes and a bag of nails are placed on a table.

Performing Quitrent Service in British Law Court

Then, when the tenants are called upon to "come forth and do good service," the city solicitor gravely places the first bundle of twigs on the block of wood and cuts it with a hatchet, cuts the second bundle with a billhook (a thick, heavy knife with hooked point, used for pruning purposes), lays out the six horseshoes, counts out 60 nails in heaps of 10 each, and then adds another heap of nails. In conclusion the "King's Remembrancer" then says "good number," and the ceremony is over.

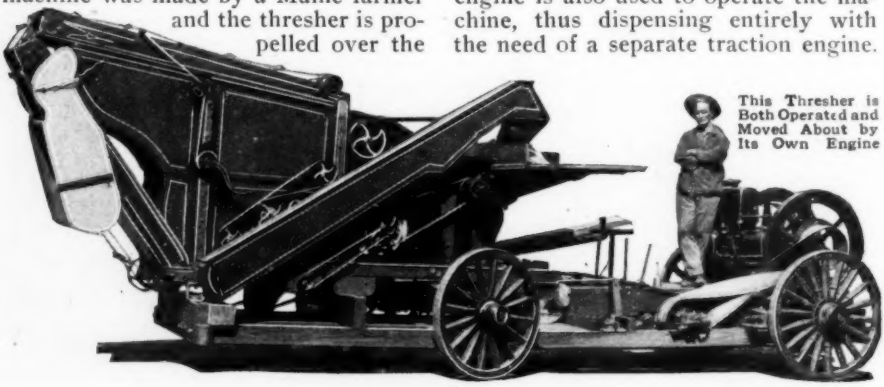
PRODUCING SLEEP WITH AN ELECTRIC CURRENT

Causing human beings to go to sleep by means of an electric current is the remarkable achievement claimed by a Berlin physician, who already has produced sleep in animals by applying electricity to the base of the brain. By using an improved method of application it is claimed that unconsciousness can be produced quickly and without danger to the individual. An alternating current is used and its effects are said to relieve insomnia, banish neuralgic pains, and provide safe means for controlling violently insane persons. The electric sleep may also be deepened for the purpose of executing criminals or slaughtering animals in a painless manner.

One way to prevent the hardening of spare automobile-tire tubes is to immerse them in hot water once every month or six weeks.

A HOMEMADE TRACTOR THRESHING MACHINE

The tractor part of this threshing machine was made by a Maine farmer and the thresher is propelled over the ground at the rate of about four miles an hour by the gasoline engine, which is mounted on the rear part of the specially constructed frame. The same engine is also used to operate the machine, thus dispensing entirely with the need of a separate traction engine.



This Thresher is Both Operated and Moved About by Its Own Engine

Dropping an Ocean Steamship into the Water Broadside

SIDE LAUNCHING OF AN OCEAN STEAMER

The customary method of launching ocean steamships is end first, so this instance of side launching, from a shipyard at Long Beach, Cal., might be considered unusual by persons unfamiliar with shipbuilding methods on the Great Lakes. This vessel, which is 300 ft. in length, was launched broadside because the shipyard in question lacks water space.

Broadside launching is almost universally adopted on the Great Lakes, even for the largest ships, a number of which are considerably over 600 ft. in length. The first vessel of any considerable size to be launched broadside was the famous "Great Eastern." She was so launched because of the narrowness of the water way.

BIRTHDAY CAKE THAT COST TWO HUNDRED DOLLARS

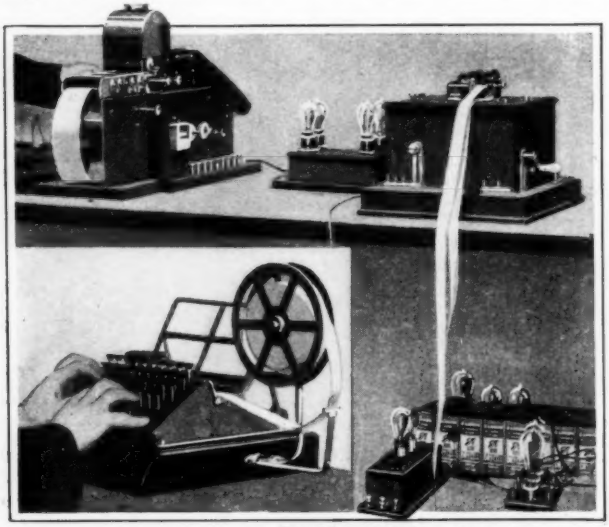
Two hundred dollars were spent by the wealthy parents of a Washington baby for a birthday cake for the infant. The giant cake somewhat resembles the crown of an African potentate. Specially selected bakers worked on the cake for several days, and every pound of sugar, fruit, etc., which went into it was carefully inspected. The upper portion of the cake represents a fountain, with doves in the basin.

Photo by Clinedinst

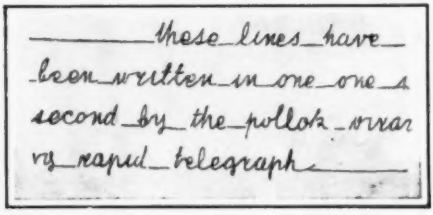
Two-Hundred-Dollar Birthday Cake for a Baby

LIGHT BEAM RECORDS FAST TELEGRAPH MESSAGES

An electric device that transmits messages at a rate claimed to be as high as 40,000 words an hour has been invented by a Hungarian and successfully demonstrated in this country and abroad. The transmitter consists of an electric motor that drives two drums between which a strip of perforated paper is drawn. The paper is perforated by means of a separate instrument operated by a keyboard similar to a typewriter. The receiving part of the apparatus consists of two telephone receivers, upon the diaphragms of which is mounted a small mirror, and the different strengths of current sent out from the transmitter cause the diaphragms to vibrate in such a manner that perfect letters, like ordinary handwriting, are produced by the movement of the reflected light from the mirror upon a strip of photographically sensitized paper. The apparatus is in operation between Paris, Nice and Boulogne, in the service of a French newspaper.



Copyrighted by Underwood & Underwood, N. Y.
Telegraphing 40,000 Words an Hour. Upper Picture Shows Transmitter at Right and Receiver at Left. The View in the Lower Left Corner is of the Machine Which Impresses the Message on Tape for Transmission



Message Transmitted and Recorded in One Second, at the Rate of over 50,000 Words an Hour

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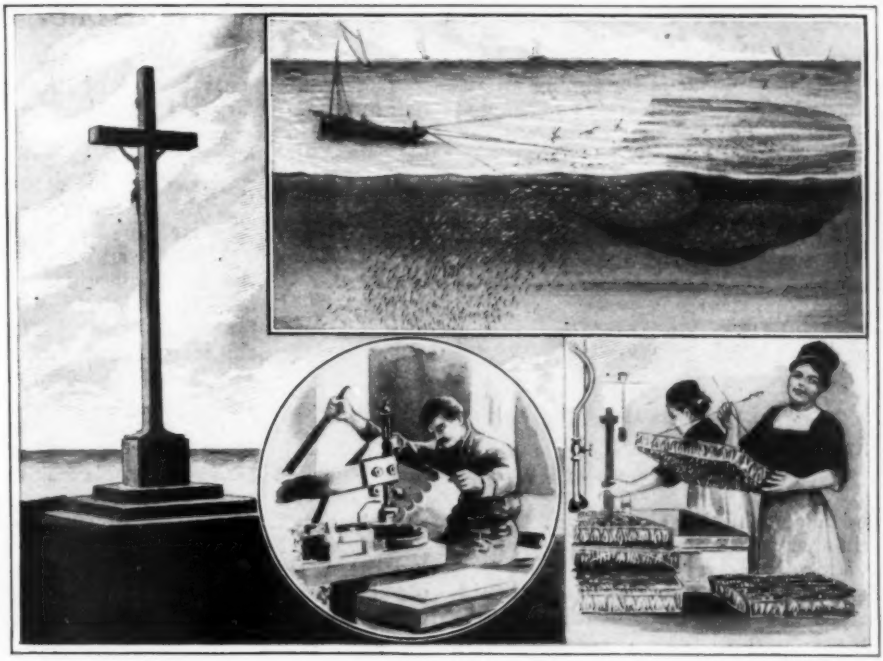
¶A ferryboat 433 ft. long and 116 ft. wide for carrying cars across Carquinez Straits, Cal., is being built.

CATCHING AND CANNING SARDINES IN BRITTANY

The sardine fishing season begins early in June and the coasts of Norway and Brittany, in France, are the scenes of the largest hauls, the grades of sardines obtained there being superior to the fish caught on the American coasts. As soon as the European fishermen observe shoals of porpoise or flocks of sea gulls off shore the fishing boats are sent to the locality, for the presence of these shoals is an indication that schools of sardines will be found there. One of the peculiarities of sardine fishing is that distinctive types of nets or seines are used in different localities. The net shown in the illustration is employed on the coast of southwestern Brittany. When it is judged that a sufficient quantity of fish have been caught in this pocketlike type of net, the edges and top are drawn together as a purse is closed with strings. The



Village Crucifix at Concarneau, Brittany, That Guides Sardine Fishermen to Shore

Catching Sardines Near the Coast of Southwestern Brittany

Making Sardine Cans in Breton Cannery

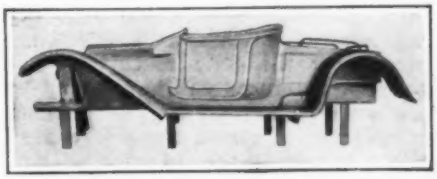
Cooking Sardines in Breton Cannery

net is then hauled in and the catch taken into the boat by means of dip nets. After the fish are brought ashore they are spread on a table and sprinkled with salt. Then they are cleaned, sorted and dried by being suspended in the open air upon wire screens or nets called "grills." The fish are next laid on wire gratings, two rows deep, and plunged into a boiler containing pure olive oil, which is kept boiling over a furnace until the sardines are sufficiently cooked, when they are taken out and allowed to drip until dry. They are then taken to the oiling room and packed in tin cans with oil and sealed for shipment. For several years past the Breton fisheries have been declining and now produce only a few hundred thousand cans annually.

¶ Egg-shaped briquettes of coal waste compressed with a tar binder are being experimented with as fuel by an English railway.

MOTOR-CAR BODIES MADE FROM CLAY MODELS

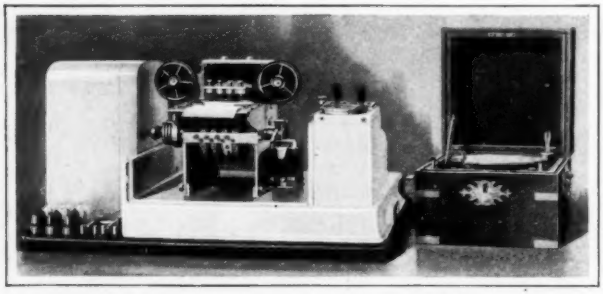
A builder of all-steel motor-car bodies is using a new method of design, the first step of which consists in molding the model from soft clay and then shaping it until the desired form is obtained. The proportions of the model are then used in building the steel bodies. The all-steel body is placed in a large oven for the purpose of baking on the enamel and properly drying the paint and varnish, thus causing the finish to adhere more permanently to the metal.



The First Step in Creating a New Design of Motor-Car Body

INSTRUMENT FOR TIMING AN AUTO RACE

This instrument is for timing an automobile race, accurately measuring the length of telephone conversations, and registering the elapsed time of certain mechanical operations. The timing of a race is accomplished by three wires connected to the instrument and laid across the race track at certain distances apart to represent one-quarter, one-half and one-mile distances from the timer, from which a fourth and fifth wire also extend directly across the track to indicate the starting and finishing points. When the wheels of the car strike the line the exact time is automatically printed upon a paper ribbon on the timer.



Time-Recording Apparatus for Automobile Races

TWENTY-MILE FENCE TO SURROUND PARIS

Paris is to be completely inclosed by an ornamental iron fence 10 ft. in height. This fence will be 20 miles in length, and its purpose is to prevent people from passing into the city without paying the "octroi" or local duties on foodstuffs, gasoline, and intoxicating liquors, which constitute a large portion of the civic revenues. The gates or entrances will be guarded by officials, the fence being the modern substitute for the walls of the past. What remains of the old walls of Paris will be leveled. The cost of the fence will be about $2,000,000.

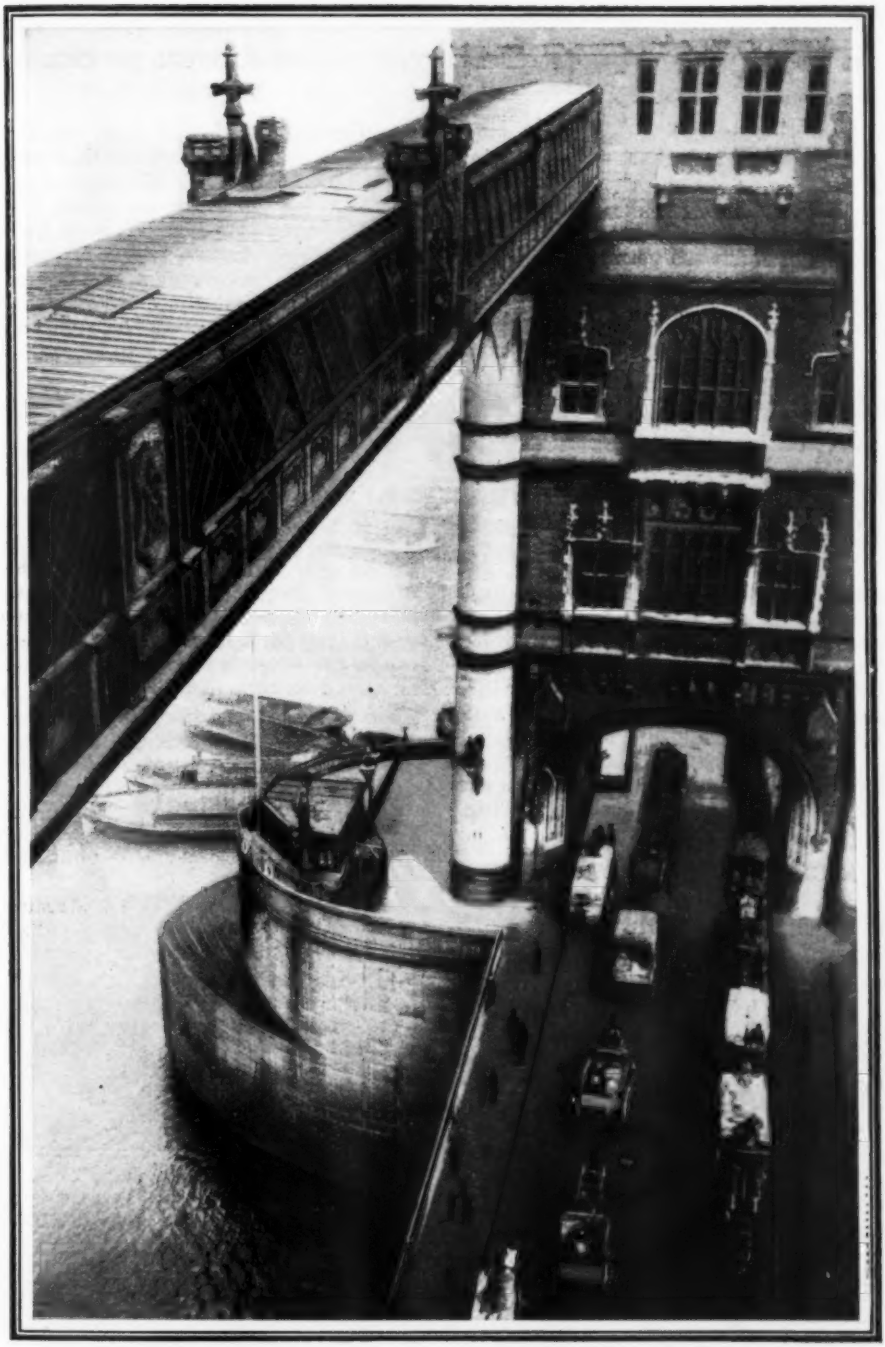
COAST-DEFENSE HYDRO-AEROPLANE

The requirements in weight lifting, duration of flight, and climbing, laid down for coast-defense hydro-aeroplanes, were recently exceeded by one of the new Burgess machines. The machine, carrying 600 lb. in addition to the fuel, oil and supplies for the flight, flew for two hours. The climbing requirement of 1,500 ft. in 10 minutes was accomplished in 7 minutes. The war department has asked for 64 aeroplanes to act as aerial eyes for the coast artillery.

The new hydro-aeroplane, embracing the Wright wing-warping principle and control, carries its pilot and passengers out in front of the main planes in the bow of the boat-shaped hull. The motor is behind, and drives the double propellers with a chain.

THE UNUSED "HIGH" WAY OF A LONDON BRIDGE

A curious example of a public accommodation which the public, for certain good reasons, would have none of is shown in the accompanying illustration of the Tower Bridge, London. The high-level, inclosed footway was constructed so that the foot passengers could continue their way across the bridge when the drawbridge was raised, the ascent to and descent from the high level being made in elevators in the towers. The public soon discovered that no time was saved by using it, as the people who waited for the drawbridge to close got across just as soon and with less trouble. As a result, this portion of the bridge was closed to the public, but it is not considered altogether a loss, as it adds much to the imposing appearance of the whole.

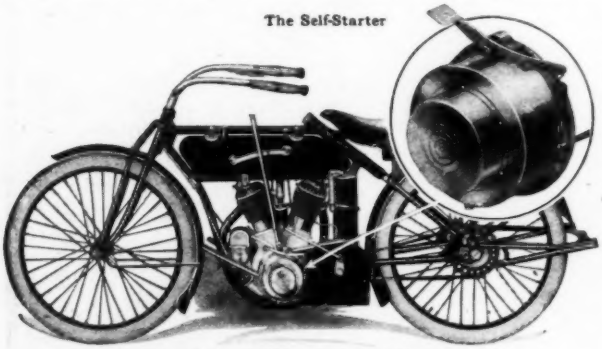


The High-Level Footway of London's Tower Bridge is a "White Elephant"

SELF-STARTER FOR MOTORCYCLES

The new models of a well-known make of motorcycles are equipped with a self-starter which whirls the motor eight complete revolutions at high speed and is then automatically rewound by the motor for the next start. The self-starter consists of two powerful springs, which unwind simultaneously, and are contained, with the necessary mechanism, in a steel case that is attached to the crank case. Pressure by the foot on a lever releases the springs and sets the motor revolving.

The Self-Starter



Location of the Self-Starter on the Motorcycle

RICHEST RAILWAY IN THE WORLD

Dangerous cataracts make navigation impossible on the Kongo River between Matadi and Leopoldville, so a railway had to be constructed to serve as a connecting link. This road, which is 246 miles in length, and cost $9,000,000, is said to be one of the richest railway lines in the world, the total receipts since the beginning of its operation in 1898 being $29,936,769. It costs $200 to transport one ton of cloth over this road from Matadi to Leopoldville, and the cost of a first-class passage is $38.60.

More than $10,000,000 worth of electric dry batteries are manufactured in America annually.

THE EVAPORATION OF OCEAN WATER

A German professor has amused himself in spare moments with calculating how long a drop of water stays in the ocean before it is evaporated, and how soon it returns to the ocean again. He figures that the average vacation enjoyed from the time a drop is evaporated, falls as rain and runs back into the ocean again, is only 12 days, this short period being due to the fact that the surface water is all that is acted upon. Calculating the total evaporation from the surface of the oceans and estimating the total volume of water in the oceans, he decides that a drop of water would stay in the ocean 3,460 years, provided it awaited its turn to be evaporated.

ELECTRIC DANGER SIGN ALL MAY READ

The American Museum of Safety has approved of the sign shown in the accompanying illustration as one that may be understood by all who see, whether they be Italian, Slav, Hungarian, German, or of any other foreign nationality. Any person knowing the English language would understand that "elektrika" has to do with electricity, and it is doubly familiar to Europeans. And aside from this, the skull and crossbones and the handful of forked lightning should be sufficient warning in themselves. The sign is placed over pits, doors and other places where there is danger of electrical contact.

ROCK FOLD WHICH SHOWS HOW NATURE WORKS

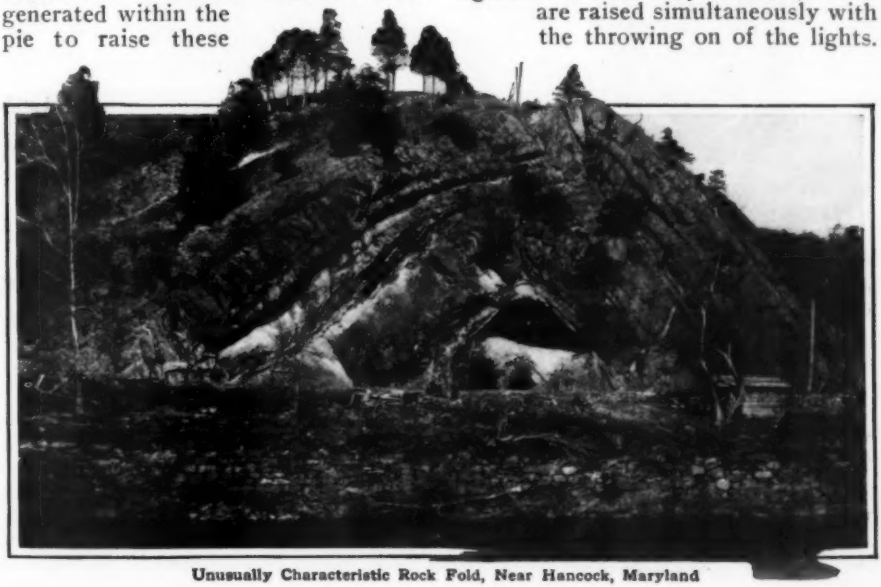
In a remarkable rock fold, which is to be found near Hancock, Md., nature itself gives a plain lesson in the formation of hills and mountains and a clear impression of the mighty forces that were at work in their making.

Originally these layers or strata were flat, the bottom of the primal ocean's bed—for the entire United States was once submerged beneath the waters of the universal ocean—but as the land was uplifted by plutonic and volcanic forces from below, the movement was irregular, the weakest portions of the earth's crust being the first to be pushed upward. The changes which occur in the crust of an apple pie during the process of baking may be compared to that which has happened to the earth's crust on a grand scale. The pie crust, as it appears on the pie when made, is even and flat. As the pie is baked and the confined gases and steam form and expand, they push the crust up, forming irregular miniature hills and valleys. If several layers of crust were used and sufficient force generated within the pie to raise these crusts, the result would be similar to that shown in the picture where the layers were originally hundreds of feet thick and the internal force and pressure of terrific intensity.

DIRECTION SIGNALS ON AUTO FENDERS

In one of the latest direction-signaling devices placed on the market the illuminating signals are located on the fenders of the automobile, both at the front and at the back, so that vehicles meeting as well as following may know that a change in direction is intended.

When a turn to the right is to be made the chauffeur presses the proper button, and the front and rear lights on the right fender or fenders shine out the word "right," while a turn in the opposite direction is signaled by the word "left" on the left-side fenders. When not in use the fronts of the signals are covered by shutters, which are raised simultaneously with the throwing on of the lights.



Unusually Characteristic Rock Fold, Near Hancock, Maryland

Camels Harnessed to Heavy Wagons in Australia's Interior

CAMELS DRAW WAGONS IN AUSTRALIA

The interiors of the southern and western parts of Australia are almost entirely without railroads, and as much of this country is practically without water supply, the problem of transportation is a serious one. Camels, imported from Asia, have been tried with fair success under such conditions. Instead of carrying the loads on their backs, however, these camels are trained to draw heavy wagons, as many as 10 and 12 of the animals being harnessed to each.

The Method of Rotating the Valves

ROTARY-VALVE MOTORS FOR AUTOMOBILES

The makers of a well-known American automobile are now equipping their machines with either the customary poppet-valve motor or a rotary-valve motor, the latter being an engine which attracted considerable attention at this

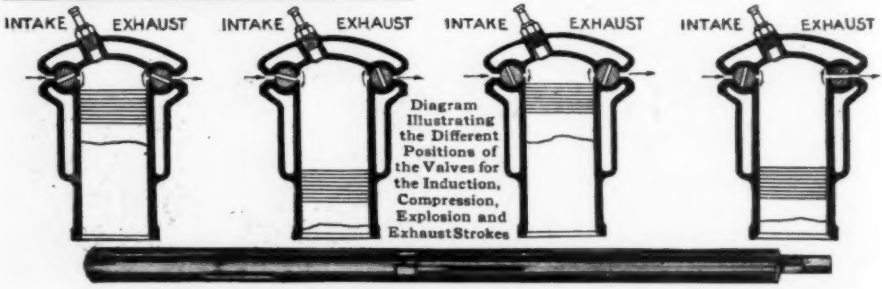


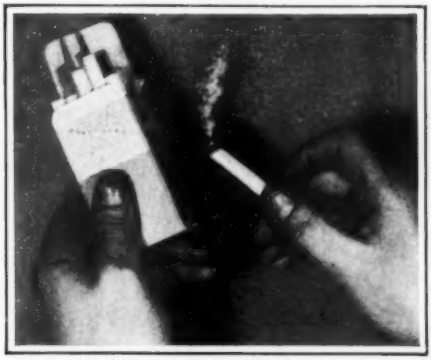
Diagram Illustrating the Different Positions of the Valves for the Induction, Compression, Explosion and Exhaust Strokes

One of the Rotary Valves, Showing the Six Slots or Valve Openings

year's automobile shows. This motor is provided with two rotary valves, each of which is a cylinder, 1⅝ in. in diameter, in two parts, connected by a special coupling. The valves each have six slots or openings, 3⅞ in. long, one for each of the six cylinders of the engine. One of the valve cylinders is for the intake and one for the exhaust. They are rotated by silent chain drive, their position and method of operation being shown in the accompanying illustrations.

CIGARETTES THAT LIGHT BY STRIKING

A cigarette that serves as its own match is a novelty in London. These

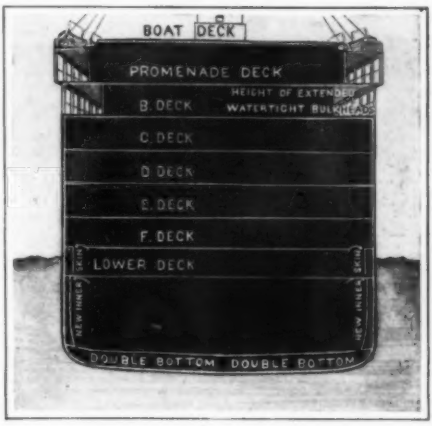


These Cigarettes Ignite by Being Scratched on the Side of the Box

cigarettes are made to strike on the box in the same manner as a safety match. It is claimed that this process of igniting the cigarette in no way impairs its flavor.

WATERPROOFING THE LINER "OLYMPIC"

The accompanying sketch shows the improvements which have been made in the White Star liner "Olympic," the sister vessel of the "Titanic." The most important alterations include the placing of an inner lining, so as to raise the double bottom above the water line, an increased number of water-tight bulkheads, and the raising of some of the latter up to what is

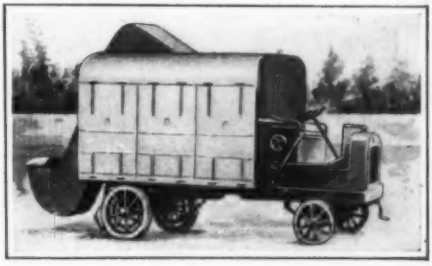


Cross-Section View of the Altered "Olympic"

known as the "B" deck, which is situated about 42 ft. above the water line. It is said that the "Titanic" would still be afloat had she been constructed in a similar manner and the steamship officials concerned have, therefore, taken every precaution possible to make the "Olympic" a disaster-proof vessel.

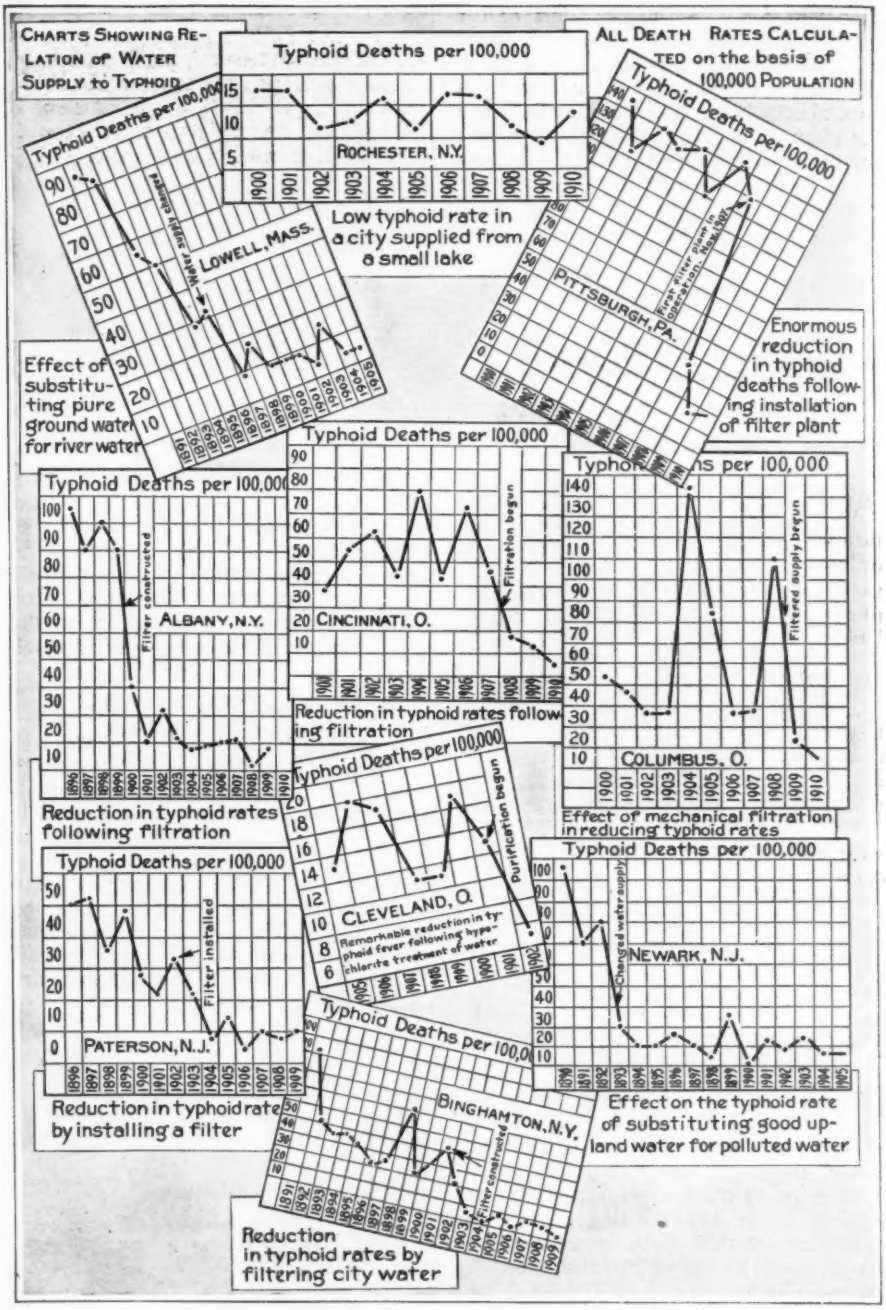
A SELF-LOADING MOTOR GARBAGE WAGON

The improved type of motor garbage wagon here shown is practically self-loading, the rear part of the vehicle being provided with a conveyor into the lower end of which the refuse is dumped direct from the garbage can of the home. The garbage is carried up to the top of the vehicle by the conveyor and then dumped into the car, and the load is removed through doors on the side of the body.



French Motor Garbage Wagon That Loads Itself

HOW A PURE WATER SUPPLY SAVES HUMAN LIVES



Filtration Plant through Which All Cincinnati Water Must Pass

THE BATTLE FOR SAFE WATER SUPPLIES—II

By Dr. ALLAN McLAUGHLIN

U. S. Public Health Service

The Sources of Public Water Supply

[No more convincing proof of the value in terms of human lives of a pure water supply could be found than the charts on the opposite page that indicate the falling off in the typhoid death rate in many cities after purifying methods were applied to the water furnished their citizens. This is the second of a series of articles in this magazine by Dr. McLaughlin, who is one of the foremost authorities on this subject. In the June number he will tell how impure water can be purified, whatever its source.—Editor.]

ALL water comes from the atmosphere by condensation or precipitation in the form of rain or snow, fog or dew. This water falling upon the earth becomes the source of our supplies. Ground water is water which has passed through the natural filter of the earth's surface, and is made available for our use by wells or springs. Surface water is the water in ponds, lakes and streams, and while it receives some ground water from springs it also receives the run-off from the watershed, following rains and thaws. Although the rain or melted snow in washing the earth's surface may become contaminated with the germs of disease, the weaker species of these, whose normal habitat is the human intestine, in passing through the upper layers of the soil meet the soil bacteria and in the fierce battle for existence soon succumb to their hardier brethren. Therefore ground water is in reality naturally filtered and purified. For this reason, in general it is a safer source of supply than surface water.

There are certain very important qualifications to this general statement. Ground water from limestone formations or when drawn from shallow wells where soil pollution is intense may be dangerous. On the other hand, surface water, though subject to contamination from sewage and the washings of the land surfaces following rains and thaws, may be safe on an uninhabited or sparsely inhabited watershed, especially if prolonged storage in natural reservoirs is provided.

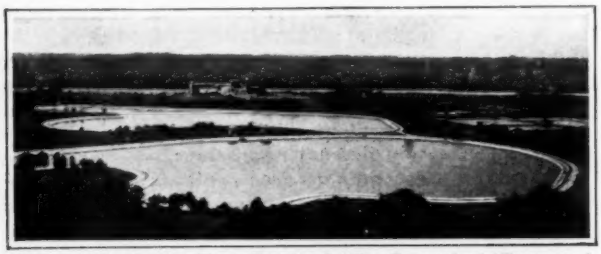
Good ground water is the ideal source for water supply from a sanitary standpoint, but there are serious drawbacks which militate against its general use. First, it is difficult in this country to obtain a sufficient flow at reasonable expense for large cities. Second, ground water is often highly mineralized, may be very hard, salty, or impregnated with iron. Ground water is available from several distinct types of sources. The area upon which the rain falls is called the catchment area. The rain water which filters through the catchment area reaches the deeper strata and is stored as ground water. Its sanitary quality will depend upon the character of the catchment area and its underlying strata and the depth from which it is drawn. If the catchment area is sand and the underlying layers sand and gravel, if the catchment area is sparsely peopled and the water is drawn from a good depth, a safe water will result.

If the catchment area is in a limestone region, the water is stored in caverns and crevices in the rock. These are in communication with each other

and with the surface pollution by means of cracks and crevices. In this way water from the surface reaches the subterranean ground water by direct channels, instead of by filtration through sand and gravel.

The danger of pollution is at once apparent. If the surface pollution is small, especially if the source is in an uninhabited or thinly settled region, ground water from limestone may furnish a safe supply. Vienna, Austria, has a limestone ground-water supply from such a catchment area, and it is conceded to be a safe supply. San Antonio, Texas, is supplied by ground water from limestone. Usually, however, large cities find the supply from such sources not only dangerous in quality but inadequate in quantity.

Ground water is much more commonly used for municipal supplies in Europe than in this country. There are two reasons for this: first, we are less fortunate in the geological formation of the country, and, second, we use or waste more water than Europeans; hence, ground-water supplies are often inadequate here which would suffice for a similar population in Northern or Central Europe. We have many areas in this country which furnish large supplies of ground water, especially on Long Island and in southern New Jersey. Brooklyn is supplied in part with ground water.



Cincinnati Purification Plant, Showing Settling Reservoirs in Foreground, Filtration Plant in the Middle and Pumping Station for Ohio River Water in Background

The amount of water obtainable by one pumping station is limited, and to collect the ground water on a large scale many separate pumping units are necessary, and this increases the cost greatly. Deep wells in sandstone are an excellent source of ground water. Areas in Michigan, Illinois, Wisconsin, and Minnesota are underlain with a water-bearing sandstone. This rock furnishes a supply which does not fluctuate as limestone supplies do and is safe from surface pollution. The supply, however, is limited to small cities, although Jackson, Mich., a city of over 25,000 inhabitants, has an adequate supply from this source.

The chief advantage of ground water is freedom from surface pollution. As stated above, when drawn from shallow wells or from limestone rock, ground water may be polluted. Its disadvantages are, small quantity available and high mineral content, giving objectionable tastes or odors or excessive hardness. The sanitary advantage of good ground water is enormous, but the small amounts available at reasonable cost generally exclude it from consideration in large cities. Further, its hardness often makes it an undesirable supply for manufacturing towns and cities.

Surface water as a source of public water supplies may be divided into impounding reservoirs, ponds and small lakes, great lakes, and rivers. In contrast with ground-water supplies, surface-water supplies generally furnish abundance of water, but are usually contaminated. The upper layer of soil with which surface water is in contact is rich in bacteria, and a part at least of the sewage and wastes from inhabitants of the watershed also finds its way into the streams. The degree of pollution will depend upon the population on the watershed. The ideal watershed is uninhabited and heavily forested. Such a watershed is rarely available in this country. A certain number of inhabitants on watersheds used for water supplies in America is usually tolerated. There are about 60 persons to

the square mile on the Croton watershed of the New York City supply, and over 700 on the Cochituate (a part of the Boston supply). Pollution from this source is supposed to be nullified by storage. The Boston, New York, Newark, Jersey City, and many other urban supplies in the northeastern states are known as impounding reservoir supplies. That is, upland streams are dammed at convenient points, making great natural reservoirs. The object of this is not only to retain the flood waters for use in the dry months, but also to provide opportunity for storage as an agent of purification. Storage permits sedimentation of suspended matter which carries down many germs, and also holds the water long enough to permit the natural death of the disease germs. Disease germs, of which the typhoid bacillus is a type, do not multiply in water, but decrease in number and gradually disappear, unless reinforced by fresh sewage additions. The time necessary for this disappearance has been variously estimated at from a few days to several weeks. Storage thus becomes a very potent purifying agent if continued long enough and if the pollution is not constant.

Small lakes and ponds as sources of supply resemble impounding reservoirs in their possession of certain natural purifying agencies and the comparative ease with which the watersheds may be policed or controlled. The danger of transient pollution is ever present, however, as in all other surface supplies. The extent of the danger bears a direct relation to the density of population and the amount of storage.

The Great Lakes form the logical source of supply for many millions of people. The supply is inexhaustible and is of excellent quality if it can be drawn at a sufficient distance from shore. Unfortunately there is a zone of polluted water all along the shore of the Lakes, and the boundaries of this zone are continually changing.

Coagulation Basins, Where Chemical Treatment is Applied to Cincinnati's Water Supply in Addition to Settling and Filtration

Considered as a watershed the Great Lakes present great difficulties in policing and control.

This polluted water is not entirely dependent upon the discharge of sewage by the cities. Even if the sewage of cities on the Lakes were purified so far as economically possible, the zone of polluted water along the shore would be very much in evidence, especially after rains and thaws. The boundaries of this polluted shore water, changing with the winds and currents, make it difficult to place waterworks intakes where they will be safe from pollution at all times. It is impracticable to go farther into the lake than a depth of 75 or 80 ft., and economically inadvisable to construct tunnels longer than 4 miles in order to escape pollution. It is an economic question and it is usually cheaper to use the shorter intake and purify the water in some way, than to extend the intake to a point which would be safe from pollution at all times. The intakes used by our lake cities are now as much as 4 miles from shore, and

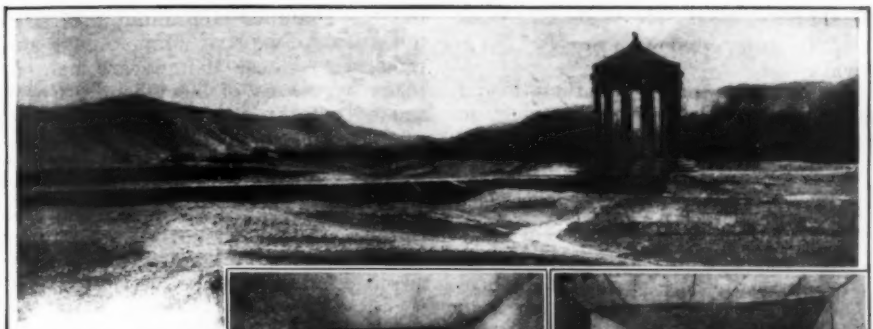
two of them are in 75 ft. of water, yet these are occasionally polluted with sewage bacteria. Practically all of these cities are considering some method of purification.

Our great navigable rivers are the natural sources of supply for many millions of people. They are usually polluted throughout their entire length, and in practically every instance river supplies are unfit for use as public water supplies, without purification. These waterways differ greatly from upland streams, ponds, and lakes, inasmuch as they are extremely difficult to control and have a large urban population on their watersheds. Many lives have been sacrificed because of delay in filtering supplies from polluted rivers, but a great deal has been accomplished in the last decade in installing filter plants in river cities.

In considering water supplies which are used without artificial purification, I desire to emphasize the fact that the only types of supply which will furnish unpolluted water at all times are a good ground-water supply and a surface supply from an uninhabited watershed. Some of the impounding reservoir supplies, like those of New York, Boston, Newark, Hartford, etc., although from rather populous watersheds have been considered satisfactory; but they receive pollution, and it is not at all certain that this pollution does not cause disease. The large storage is depended upon to nullify the pollution received. The Jersey City supply is of the impounding reservoir type and the storage was found to give insufficient purification, and since 1908 the water is treated with hypochlorite of lime, with excellent results. Baltimore, depending upon the same kind of supply, obtained by impounding the water of the Gunpowder River, had a very severe typhoid epidemic following a prolonged drouth in 1910. The dry weather decreased the runoff into the reservoir. At the same time the water consumption in the city was at its maximum and the storage factor was almost eliminated. Bacteriologic examination showed the colon bacillus constantly in small samples. With the advent of heavy rains dilution increased, storage was reëstablished, the quality of the water improved and the typhoid outbreak ceased. Baltimore has protected itself since by treating the water with hypochlorite of lime. Surface supplies from flowing rivers are in general polluted and should not be used without purification. It is not contended that pure water is not obtainable in the Great Lakes. On the contrary, the storage in these great natural reservoirs is such that pure water may be obtained beyond the zone of shore pollution. Unfortunately, to secure a supply of pure water at all times in most instances is not feasible, either because of engineering difficulties or financial considerations. It is usually cheaper to purify the water in some way, with an intake at a moderate distance off shore, than to attempt to secure pure water with a long intake tunnel.

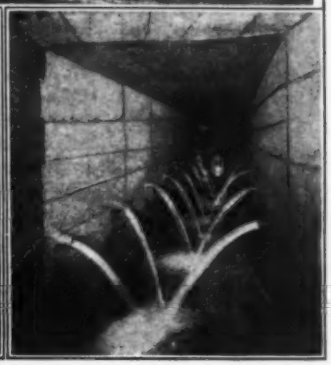
Purification of all surface-water supplies is inevitable. It is the rule in Europe, and if we carefully examined our supplies daily for the presence of colon bacillus as an index of sewage contamination, and gave proper regard to the result, we would purify in some

Reservoirs for Filtered Water, Cincinnati Purification Plant. The Highly Polluted Ohio River Water is Here Converted into Safe Water of Very High Quality

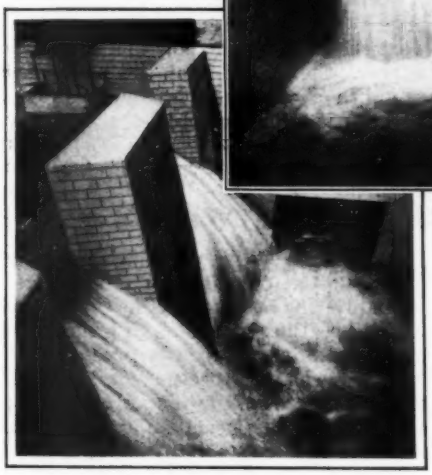


The Water Temple at Sunol, Where Surface and Ground Water Mingle for San Francisco's Supply

The Meeting of the Waters, Where Artesian and Filtered Surface Water Mingle



Filter Gallery for San Francisco's Surface Water



Ground-Water Supply for San Francisco

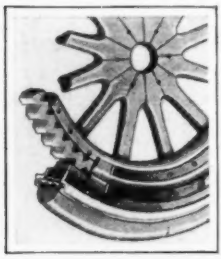
way practically all our surface-water supplies. With the limitations which prevent the wide general use of ground-water supplies, it is evident that the great bulk of our urban population must depend upon surface supplies. It is equally obvious that these supplies must be subjected to some method of purification in order to furnish safe water 365 days in the year. The various methods of purification will be discussed in my next article, in order to give some idea of their relative value, cost, and availability.

TREATING GASOLINE WITH CAMPHOR FOR MOTORS

English motorists have found that camphor dissolved in the gasoline results in fuel economy, and scientific tests are about to be made to determine to what extent the claims are justified. A motorcyclist tried 1 oz. of camphor to 4 gal. of gasoline, but found that this made the mixture too rich. Using 1 oz. of camphor to 5 gal. of gasoline, he estimates that the saving in fuel is at least 20 per cent. An automobile user states that he used camphor in his gasoline for six months, the proportion being 1 oz. of camphor to 5 gal. of gasoline. He claims that the camphor has resulted in considerable economy in fuel consumption, that it has made possible the climbing of hills at high speed, and that his engine, which had been very difficult to start, gives no more trouble.

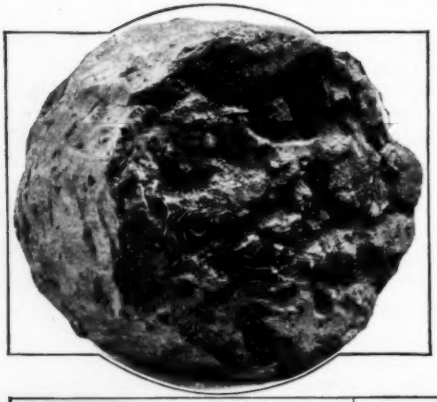
RUBBER-CUSHION WHEEL FOR MOTOR CARS

An entirely new type of motor-car wheel, constructed with no connection between wood and wood or iron and iron, except through rubber, is here shown. The invention is practically an automobile wheel fitted with two rims or felloes instead of one. Between these felloes is placed a rubber cushion consisting of a corrugated strip of rubber for making the wheel springy. The wooden felloes and the space between them are covered on both sides with ring-shaped rubber flanges, making the chamber containing the cushion absolutely proof against dust and moisture. These flanges are held in place by means of steel bands, which are bolted through to each side and overlap the cushion chamber so as to prevent a lateral or side motion. The outside felloe is faced with an ordinary steel tire. A long life is claimed for this wheel on account of its rubber cushions being inclosed, thus avoiding any friction or wear between the parts.

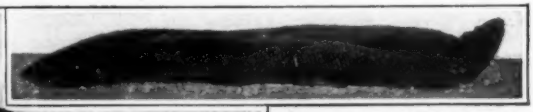


¶ By means of a delicate apparatus known as the microdynamometer, roughness or softness of the enamel of the teeth can be detected even when it has progressed to a very slight degree. The value of this device to dentists is said to be considerable, as it enables them to detect the beginning of tooth decay much earlier than has heretofore been possible.

A FISH THAT LIVES OUT OF WATER



A fish that is provided with a lung for living out of water for months and probably for a year at a time, and which breathes by means of gills when in the water, was recently presented to the American Museum of Natural History by the Public Museum of Liverpool. This peculiar type of fish, which is the second living specimen of a lungfish ever brought to the United States, originally came from the Gambian region of Africa coiled up in the form of a cocoon inclosed in a large lump of earth that had been a part of the bottom of a dried-up stream.



Above: Showing Breathing Hole of Lungfish in Lump of Hardened Mud
Below: The Lungfish as It Now Appears

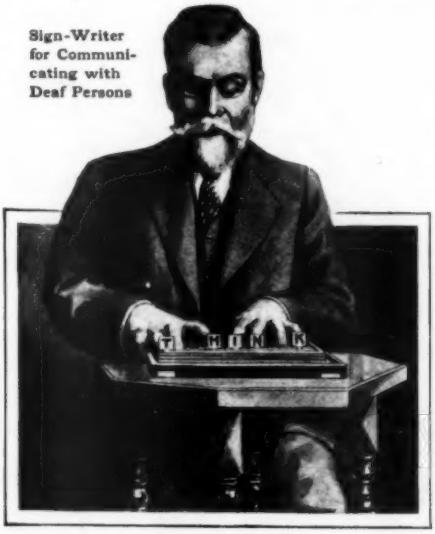
The Lungfish Just Out of Its Prison of Mud

When the clod of earth was received at the museum the only indication that there was life within the

hardened mass was a small hole through which the fish breathed. The fish was removed from its prison by placing the latter in warm water until the shell became soft enough to remove a part of it, when the fish emerged alive. It is claimed that this species of fish has survived from a very ancient period of time and belongs to the earliest known species of land-living animals that form the connecting link between the true fish family and four-footed animals.

SIGN-LETTERS FOR TALKS WITH THE DEAF

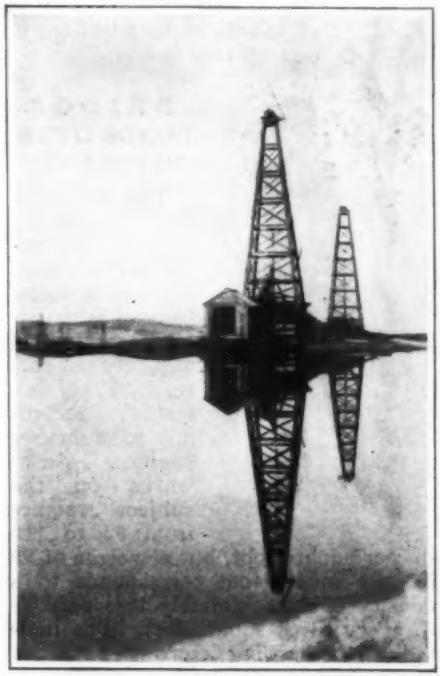
Talking to the deaf without knowing any sign language is accomplished by means of a typewriterlike apparatus devised by a French physician. It consists of an ordinary keyboard, with 42 keys, operating levers to the ends of which lettered tags are attached, so that when the keys are pressed the corresponding letters are brought into view, forming syllables or whole words. The letters are of a size calculated to make them plainly visible to a person of normal sight at a distance of 10 ft. for the smaller machines, and 20 ft. for the larger.



Sign-Writer for Communicating with Deaf Persons

OIL DERRICK PRESENTS NOVEL ILLUSION

This illustration of an oil derrick in southern California presents one of the



An Optical Illusion in Oil

most remarkable illusions ever caused by reflection. Were it not for the grass and shadow of the lake bank dimly seen in the lower right-hand corner, it would be impossible to tell which is the top and which the bottom of the picture. The reason for this absolute perfection in reflection is that the lake is composed, not of water but of oil, the lake being, in fact, a natural oil reservoir. Where immense gushers are struck which flow continually day and night, the only possible way of saving the oil has been to quickly throw up an earthen dam across some convenient ravine and turn the flow into a great reservoir, whose surface is as smooth and rippleless as glass.

DRILL SIX FEET LONG

One of the largest drills ever made is shown here. It was specially made for a large Pennsylvania woodworking plant for putting a hole through a stack of boards up to 6 ft. high in one operation.

BRIDGE LOADS OVER-ESTIMATED

The weight of foot passengers used in the calculations of stresses in metal bridges is generally exaggerated and does not correspond to any reality, according to a bridge engineer. Special works on the subject require from 92 to 112 lb. per square foot, but a weight of 92 lb. per square foot corresponds to a density of approximately two persons to every three square feet. The individuals composing a crowd so dense as this would be squeezed together in such a way as to prevent any movement.

In attempting to reach an idea of just how dense a great crowd may be, a number of photographs were made. Assuming the average weight of the persons in these crowds to be 150 lb., the photographs indicated that the maximum load would not be more than 30 lb. per square foot.

On these observations the designer in question bases his opinion that, with the usual factors of safety employed, the estimate of 92 lb. per square foot is very excessive.

More than 1,000,000 gal. of kerosene oil are now consumed by the world every day, and the United States output during 1912 was 220,000,000 gal.

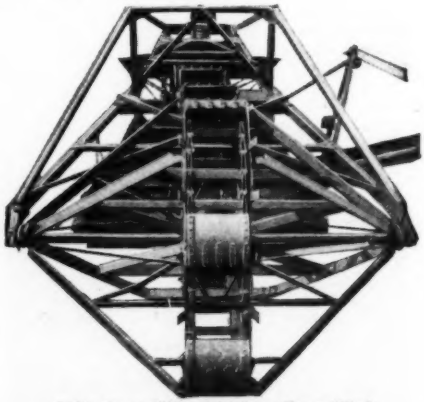
OLYMPIC GAMES OF 1916

Even before the International Olympic Committee had announced its decision to hold the Sixth Olympiad at Berlin in 1916, building and financial plans had been completed for the Berlin stadium. Its erection commenced immediately after the decision was formally announced to the German government, and it will be completed by July of this year, so that there will be a full three years in which to test exhaustively all its arrangements.

The stadium, which will cost in the neighborhood of $550,000, will be in the Grünewald, the beautiful forest on the western outskirts of Berlin, in the exact middle of the race course of the Berlin Jockey Club. In the center of this inclosure is a little valley, in which the stadium will rest. No part of it will rise above the level of the race course.

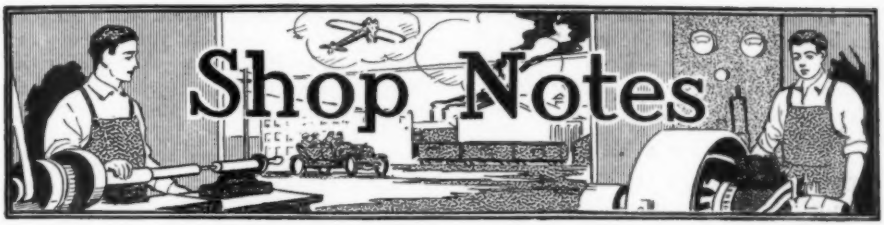
ANOTHER "WHAT IS IT?" MACHINE

The machine which was illustrated in the April issue under the head, "An Inhospitable-Appearing Machine," is an automatic side-cut brick table which cuts a stream of clay into whatever size brick is desired.



It Looks as if It might be a Queer Kind of Vehicle, but It Isn't

In the accompanying illustration is shown another machine which may baffle the imagination of some readers.

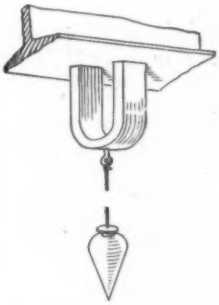


Drawing Water into a Dry Well

Having a well that would fail in water supply during a drouth and not caring to dig it deeper, I decided to try out a plan for drawing water into the well. I made an air-tight covering for the top and lowered a box of shavings, soaked in gasoline, to the bottom with a fuse attached that could be ignited through a gimlet hole in the covering material. The burning of the shavings caused a vacuum which drew the water through the earth in the bottom of the well, and when I uncovered it, I had plenty of water and have not been without water since that time.—Contributed by J. W. Bauholster, Gresham, Oregon.

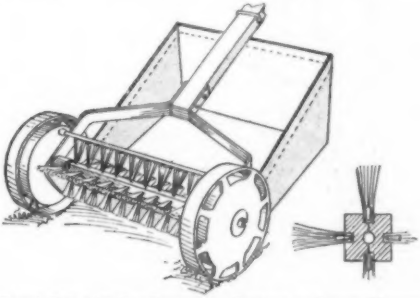
Magnetic Plumb-Line Holder

A handy little device for holding a plumb line is shown in the sketch. It is especially valuable to one working alone around iron structures or in places where a plumb line cannot be tied to iron work. It consists of a rectangular piece of tool steel bent to a U-shape, the ends squared and a hole drilled in the center of the bend for a screweye. After hardening, the screweye is riveted in place and the steel magnetized. The size of the magnet will depend upon the weight of the plumb bob used.—Contributed by M. J. McGall, W. Orange, N. J.



A Lawn Sweeper

Not having any use for an old lawn mower I converted it into a lawn sweeper that served the purpose of picking up leaves and pieces of cut grass in a satisfactory manner.



Brush Substituting Revolving Cutters on Lawn Mower for Sweeping and Picking Up Leaves

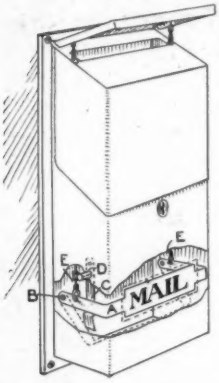
The sweeper was easily and quickly constructed with little expense in the following way: I removed the revolving blades and substituted a brush. The center part for holding the bristles of the brush consisted of two pieces of wood, cut to the length of the old blades and then grooved to fit over the mower axle. They were fastened together on the axle with glue and nails, after which a hole was drilled through the wood and axle and a pin driven in to prevent the finished brush from turning on the metal axle.

The tufts of bristles were taken from a couple of old brushes, $\frac{3}{16}$-in. holes, $\frac{9}{16}$ in. deep, were bored into the four sides of the wood axle $\frac{3}{4}$ in. apart and the tufts well glued and inserted in them, then further secured with wood pegs or wedges. The ends of the bristles should just clear the knife on the mower when they are revolving.

In running this machine over the lawn the brush will throw the leaves into the apron at the rear.—Contributed by Warren E. Crane, Cleveland, Ohio.

Indicator for a Mail Box

An indicator showing when mail has been deposited in a mail box makes it unnecessary to step outside to see if any letters were left by the postman.



The indicator consists of a piece of heavy tin, A, ½ in. in width and long enough to work up and down freely when placed in the box in the position shown. The center of the tin is cut to a size and shape to correspond with the opening in the front of the box. The ends of the indicator are hinged on rivets, B, so that it will swing as shown by the dotted lines.

A spring clip, C, is riveted to one side of the box in a position to hold the indicator up, and a push button, D, to release it when the mail is removed from the box is provided. Small chains, EE, connect the indicator with the cover of the letter slot, so that when the latter is raised it sets the indicator, which is held in the position shown until released by the button D.—Contributed by F. L. Matter, Portland, Oregon.

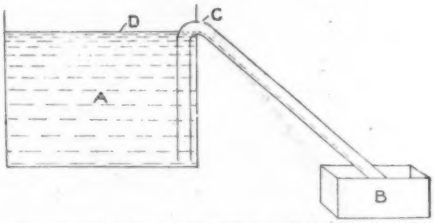
Protecting Glass While Painting Window Sash

The modern bungalow door with its square sash and many panes of glass makes a very tedious job for a painter since at least five coats of stain, filler and varnish are required. The following is a method I am using in the case of plate glass: Common-weight manila paper is brushed with linseed oil and dried, then cut into sheets the same size as the glass. A piece of the paper is placed in the open sash, then the sheet of glass and another sheet of paper on top of the glass. The glass is fastened in the usual way. The pane of glass is now protected on both sides and remains so until the finish is completed and dry, when the paper is cut out by following the edges of the opening with a blunt-pointed knife held at right angles to the glass. The result is a bright, clean job and a moisture-proof packing between the glass and the wood. The paper is translucent and transmits enough light to work by easily.—Contributed by I. L. Sears, Waverly, Ill.

Siphon for Large Tanks

A swimming pool, or any tank having its drainage overflow at the surface of the water instead of at the bottom, is easily siphoned dry for cleaning purposes by using the device shown in the sketch. The drain pipe passes through the side of the reservoir A, beginning of course near the bottom. The outer end of the tube must be lower than the bottom of the tank A, and is immersed in a small box of water B. At the top of the bend C is a small air hole which can be opened or closed readily.

In operation, if a constant stream of water is flowing, the tank A fills to the level D and the water trickles



The Siphon is Started by Filling the Tank above the Highest Bend in the Pipe

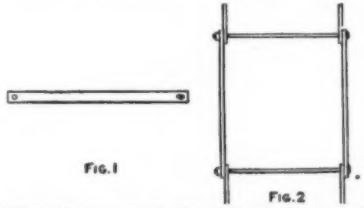
down the tube. If the small air hole at C is open the water will only flow out to a certain level. If it is desired to empty the tank, no laborious pumping is required to start the big siphon.

Merely plug the air hole C, and the running water drags practically all the air out of the overflow pipe. It then fills with water and acts as a siphon until the tank A is emptied.

If there is no constant flow of water, the siphon can be started by turning on a temporary stream until sufficient air is taken out of the drain tube. It is evident that, unless the outer end of the tube is covered with water, the siphon cannot be started in this way. —Contributed by Harry W. Holmes, Richmond, Ind.

A Fire Escape

A very serviceable fire escape can be made of stake iron and long bolts in the manner shown. The iron forming the side bars, Fig. 1, should be 15 in. long, 1½ in. wide and ¼ in. thick. A ½-in. hole is drilled near each end of the two pieces and bolts, 12 in. long and ½ in. in diameter, are used for the connecting parts or rungs, as shown

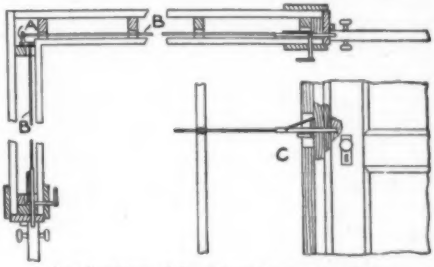


Folding Fire Escape, Made of Metal, That can be Quickly Attached to a Window Sill

in Fig. 2. The upper end pieces are bent and pointed so that they can be hooked on a window sill. A fire escape of this kind, when folded, will not occupy much space, and can be attached to a window sill and lowered almost instantly.—Contributed by Wm. Jenkins, New York City.

Lock for Double-Entrance Doors to a Bathroom

A bathroom having two entrance doors should be provided with a device for locking both doors at the same time from either entrance, and this provision made when the building is in the course of construction. If the doors are located at right angles, a bell-crank lever must be used at A which is joined with two rods, B B, running to



The Locking of One Door Causes the Other to be Locked Simultaneously

the latches at the doors. A lever, which is duplicated on both doors, is made as shown at C. When one door is locked by turning its lever, the other door is locked also.—Contributed by J. E. Carter, St. Petersburg, Fla.

Sliding Display Board on a Show Case

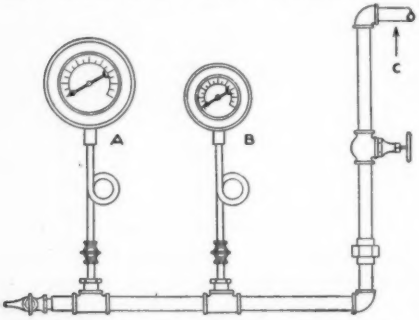
Show cases used for displaying metal goods or any material that is apt to scratch the glass may be fitted with a protector on which articles are placed when they are shown to a customer. A board can be easily made by a carpenter or a handy man, of the same material as the show case and finished in the same manner. The end cross-pieces are rabbeted, as shown at A, and mortised to receive the ends of the centerboard, which can be finished in natural wood, or ribs may be put on the edges to form a depression to re-

The Board can be Used at Any Place on the Top of the Show Case

ceive a piece of heavy felt. The protector can be slipped along on the show case and used at any place for showing the goods.

Homemade Gauge Tester

The large number of air and water gauges about my plant made it necessary to have a gauge tester, says a correspondent of Power. I constructed a

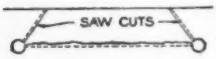


Standard or Test Gauge and Gauge to be Tested on the Pipe Line from a Boiler

tester at home and connected it to the boiler as shown in the sketch. The standard or test gauge is located on the pipe line at A and the gauge to be tested at B. The boiler connection is at C. Gauges may be tested at different pressures by partially closing the valve in the steam line and opening the drain cock at the end until the desired pressure is obtained, as would be shown by the gauge A. All gauges can be kept in perfect working order with very little trouble and expense by using this tester.

How to Cut Dovetails in Metal

Dovetailing in a piece of metal is a very common construction for repairs and for new work, but is usually a slow and exacting job. The task can be made easier by drilling and sawing out the part for the dovetail

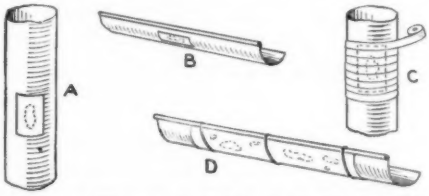


insertion. After laying out the dovetail mortise, as shown by the dotted line in the sketch, two holes are drilled at the corners in such a position that a part of them will be left after the dovetail slot is finished. This is seldom objectionable, leaves a much stronger corner, gives clearance for dirt, and cuts the metal out where it is hardest to work. Two saw cuts are taken just inside of the dotted layout lines. The metal between these lines can be roughed out by any convenient process, drilling, milling, chipping or planing, removing the metal to the lower wave line. In this manner very little stock is left to finish, and the work can be done to the best advantage, as there are no corners to be cut out.

Care of Rain Pipes

The rain pipes of a house should have attention from time to time, and be covered with a coat of good paint inside and out at least once a year. If this is neglected particles of paint will be removed in time, and the unprotected surface of the tin will rust and make a hole rapidly.

If a hole does appear, it should be repaired immediately, in the manner shown at A and B. The surface of the pipe around the hole is thoroughly cleansed of oil, paint and rust, then a



Patches as They are Applied to the Surfaces of Rain Pipes and Gutters over Rusted Parts

piece of tin is cut to cover the opening, allowing a sufficient margin for fastening with solder. After soldering the patch in place the repair is well covered with a coat of paint on both sides.

If no soldering outfit is at hand or one is unable to do soldering work, the repair can be made as shown at C. Coat the piece of tin and pipe around the hole with tar and, while the tar is still in a liquid state, place the tin over the hole and secure it in place by winding some tire tape or electrician's tape around the pipe. The tar will prevent leakage and the tape will hold the tar in place in very warm weather.

When a pipe has been neglected

until it has rusted so that it cannot be cleaned for soldering, it can be repaired as shown at D. A piece of galvanized metal is procured, long enough to cover the part damaged and with sufficient ends to lap on the part not rusted, and bent to the shape of the pipe or gutter, as the case may be, whereupon the inside is coated with tar and the piece placed over the holes. Secure the piece with wire and apply the tape at both ends to prevent the tar from running out. Coat the inside of the gutter with tar and apply a coat of paint on the metal part. A little attention in time will save the cost of a new system.—Contributed by Edward Sieja, Chicago, Ill.

A Glass Cutter for Circular Work

By F. W. BENTLY, Jr.

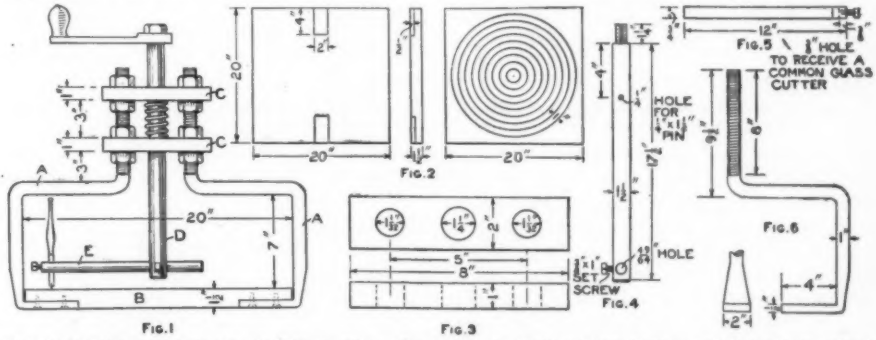
A cutter for making glass disks is almost a necessity for a repair shop of any kind. The varieties of work requiring the use of such a device are quite numerous, but in a great many instances work of this kind is very crudely done by means of an unguided cutter.

A detail sketch of a circular cutter that can be constructed cheaply is shown in Fig. 1. The supports A A are made of 1-in. round iron, flattened at the lower end and bent so as to allow the cutting bed B to be fastened to them. The upper ends are threaded for a standard 1-in. nut, and by means of 8 of these nuts the guide plates C C are securely held. In addition to acting as a bearing for the cutting shaft D, the plates are rigid supports for the upper part of the cutter.

circle, the center of all circles, of course, to be in line with the center of the cutting shaft D.

The guide plates are shown in Fig. 3, and a detail of the main cutting shaft in Fig. 4. A hole is drilled in the lower end of this shaft to receive the cutting arm shown in Fig. 5. At the end of the cutting arm E, Fig. 1, a hole is drilled of sufficient size to hold a common wheel glass cutter. The supports AA, Fig. 1, are shown in detail in Fig. 6.

A light spring, Fig. 1, should be used to automatically raise the shaft D after the cut has been taken. The device can be instantly set to cut a circular piece of glass to any diameter, limited only by the size of the cutting board B. The cutters may be cheaply replaced when they become worn.



Details of Different Parts for the Construction of a Frame to Hold a Glass Cutter and Drive It in a Circle for Cutting Circular Disks of Glass to Replace Circular Gauge Glasses, and Various Similar Work

The detail of the wooden cutter bed is shown in Fig. 2. The circular guide lines should be scratched with a difference of 1 in. in the diameter of each

¶The reed of an automobile horn may be renewed by flattening it with a hammer, then filing the edges to fit closely into the opening without touching.

Temporary Book Index

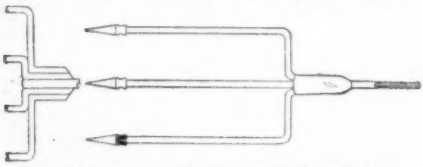
In the study or translation of a book in a foreign language it becomes necessary to refer constantly to the notes

Bill Clips Make an Interchangeable Tab for Indexing, as well as for Holding Divisions of a Book

and vocabulary or index, which many times causes one to lose the place in the text. The use of a few ordinary bill clips, as shown in the illustration, makes it easy to locate instantly any part of the book to which it is desired to refer. The clips separate the unused part of the book from the used and the handles may be labeled as desired. Various sizes can be used, but it is best to select the smallest that will hold the number of pages desired to be clamped together.—Contributed by Harry Schectman, W. Orange, N. J.

Fish Spear with Removable Points

The main part of the spear is made of $\frac{3}{16}$-in. machine-steel rod, and, in the construction of the three-point spear,

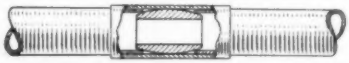


The Points on the Prongs are Hardened Steel and may be Removed and Sharpened

the center rod runs straight and the two outside prongs are bent in the shape shown, then bound to the center rod with fine wire, whereupon the joint is brazed. The four-pronged spear is made in the same manner with all four prongs bent and brazed to the end of the center rod. The points are turned from $\frac{1}{4}$-in. drill rod, then drilled and tapped. The ends of the prongs are threaded to receive the points. After making the points they are tempered. An extra set of points may be kept on hand and used for replacing points that become broken or bruised on rocks.—Contributed by F. S. Cummings, Detroit, Mich.

Stopping a Leak in Nickelplated Pipe Connections

The connection between two nickelplated pipes in a newly installed lavatory leaked and all attempts to stop it with pipe-thread lubricant failed. The walls of the pipe were so thin and the coupling so short that any substance in the threads would tend to spring the metal out of place. The leak was successfully stopped by inserting a babbitt-metal sleeve, or washer, between the ends of the pipe in the coup-

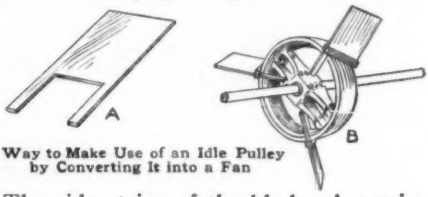


A Babbitt Sleeve in a Coupling between the Ends of Thin Nickelplated Pipes

ling. The babbitt was cast in oval shape and a hole drilled through the center. When the ends of the pipe were turned into the coupling against the babbitt, the sharp edges imbedded themselves in the metal and made a tight joint.—Contributed by J. S. Grant, Winchester, Va.

Fan Blades on an Ordinary Pulley

Having an idle pulley on a rapidly running line shaft, I fitted it up as a fan. Three blades of $\frac{3}{8}$-in. white pine, cut as shown at A, were fastened on the pulley B at an angle of about 45 deg. Braces were nailed on for added security. No attempt was made to smooth up the blades, but the fan, nevertheless, gave good satisfaction.



Way to Make Use of an Idle Pulley by Converting It into a Fan

The side strips of the blades A are intended to be nailed to the sides of pulley having no spokes.—Contributed by James M. Kane, Doylestown, Pa.

Segment Work in Pattern Making

By J. H. SHELLY

There are certain kinds of pattern work that require considerable strength, and, for convenience in finishing, it is best to build up the parts in segment courses. This method is to fill in successive layers or courses of wood, their total being equal to the thickness of the piece required and each course divided into a convenient number of pieces called segments. The courses are built up with the segments of one course overlapping the joints of another in a manner similar to laying bricks in a wall. There should always be an equal number of segments in each course. The object of this method is to have the straight grain of the wood to follow, as near as possible, the outline of the pattern, thus eliminating end wood and minimizing the short grain, two factors that usually weaken a pattern.

To turn out this kind of work successfully it is necessary to keep in mind a few general rules, which hold good when applied to all classes of work. It is necessary to use thick, hot glue to obtain the best results, and for the smaller-surfaced segment work the thickest glue should be used. Wherever it is possible to do so, nail the segments together as they are put on, but if for any reason nails cannot be used, it becomes necessary to use toe-nails or, as a last resort, screw clamps. With the screw clamps it will be necessary to wait for the glue to set before starting another course, but by toe-nailing one course to another the process may proceed without interruption.

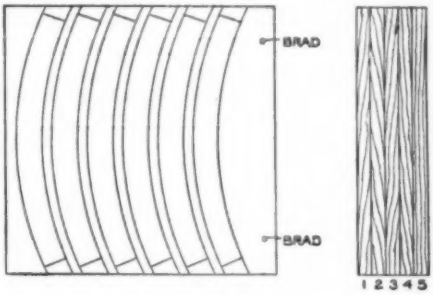


FIG. 1

Cutting Segments with the Grain of the Wood So That There will be No Waste

Use five nails or brads to each segment, three on the outside and two on the inside. The locations for the three outside nails are one at each end and one in the center, the inside ones being placed between the locations of the others. Start the nails before applying the glue and, when nailing, do not drive them in flush, but allow the heads to project about $\frac{3}{16}$ in., so that they may be drawn when the glue is set. Always size the joints between the segments by daubing the ends with glue and rubbing it into the wood with the finger tips. Unless this is done, the inside corners at the butted joints are apt to chip off in finishing, especially if they are to be turned on the inside.

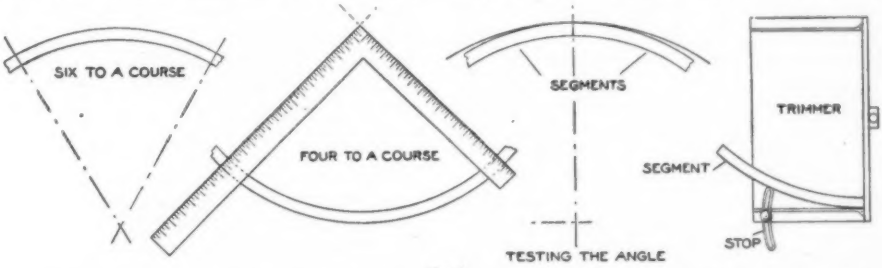
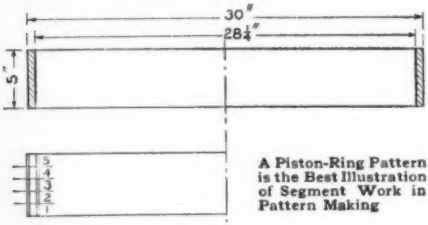


FIG. 2

Manner of Laying Out and Trimming the Segments, Also Fitting Large Segments in Place with the Use of the Trimmer after Setting the Stop to Obtain the Proper Angle

For circular work, the most convenient number of segments to a course is six. The radius of the circle being approximately 1/6 of the circumference,



A Piston-Ring Pattern is the Best Illustration of Segment Work in Pattern Making

Fig. 3

it is easy to lay out this number of segments, but for very large circles it will be found more economical to divide into eight or even more segments. Small pieces, that are to be turned on the outside only, may be built with four segments to the course, but for inside turning this will not be found satisfactory, as there is too much short grain at the ends of the segments to make a good job.

The number of courses in any particular job will have to be regulated by the thickness of the stock at hand, but three is the smallest number that should ever be used, unless it is something that is to be screwed or otherwise permanently fastened to another piece that will help to strengthen it and keep it from warping.

In marking off segments preparatory to sawing, always use a template made of a piece of thin stock, unless they are very small and can be conveniently laid out with a pair of dividers. If the segments are thin, the stock may be dressed a little full of the required thickness and cut a little longer than the segment length, then after fastening them together with brads much time will be saved in marking them out from the template and in sawing. When cutting the segments in this manner be sure to saw them to length first, allowing $\frac{1}{16}$ in. or more for trimming. This part of the work is fully illustrated in Figs. 1 and 2.

A saving in thickness may be effected by dressing large segments after they are sawn from the rough plank, and a considerable saving in time by setting the trimmer to the right angle and trimming the ends of all the segments at one setting. This is done by setting the stop on the trimmer as near as possible to the right angle and making the final adjustment by trimming one end of two segments, butting them together and trying them on the circle until the right angle is struck. This makes it necessary to fit but one segment in each course, the last one being trimmed to length.

A piston-ring pattern is a good illustration of this work. The one shown in Fig. 3 is to be finished 30 in. in diameter on the outside, 28¼ in. inside diameter, and is 5 in. deep. Lay out the full-sized section of one side, or half of the ring, adding 1/8 in. for machining, inside and out, at the top, and $\frac{3}{32}$ in. at the bottom; and make an extra allowance of 1/8 in., inside and out, for turning the pattern. The allowance for machining at the bottom is for draft. The segments are cut out as described, a face turned up and the center located. Do not remove the faceplate from the lathe, but set the trammels and strike a circle, the diameter of which is equal to the rough outside diameter of the pattern. In this case it will be about 30½ in. Divide this circle into six equal parts and at each division paste a piece of newspaper about 2 in. square. The joints between each segment should fall in the center of these squares and be glued to them at the ends. This will be found sufficient to hold the ring to the faceplate while turning, and the joint is easily broken with a sharp chisel when the job is finished. Put on the first course of segments, toe-nailing them to the faceplate, and then face off for the second course which will be nailed to the first, but, in facing off, be sure to use a diamond-point tool taking a light cut for roughing.

The courses that follow require no explanation, and by the time the job is built to the proper height, the glue in the paper joint should be dry enough to start turning, but if there is any un-

certainty on this point, it would be better to use a few screws to hold it on the faceplate.

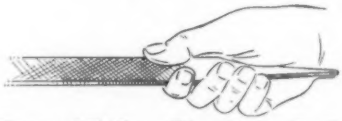
Always build segment jobs on the faceplate in the lathe, unless there is some very good reason for doing otherwise, as there is nothing that consumes so much time as rolling a large faceplate back and forth between the lathe and the bench.

Filler for Cracks in Furniture

Pour boiling water over a quantity of sawdust placed in an earthenware vessel and allow it to set for about one week, thoroughly stirring the mass frequently, then boil it over a fire until it has the consistency of thick paste. Pour this in a coarse cloth and squeeze out the excess moisture. When required for use mix a little of it with a solution of glue water and fill up the cracks or holes with the mixture. When this dries out it has the appearance of wood.—Contributed by Clarke Hill, Weston, Can.

Holding a File without a Handle

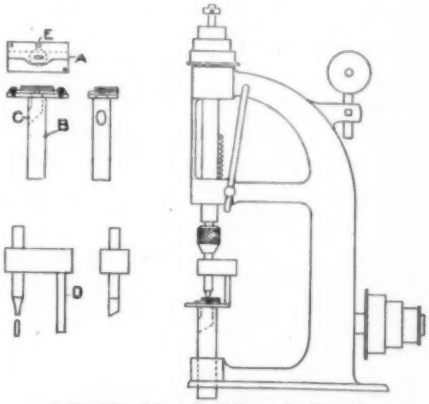
Accidents without number have occurred from running the tang of a file into the hand. It is always best to have a handle on the file, but if none is at hand, the file can be safely held as shown in the sketch. It will be noticed that the tang end is not in the hand, and that the hand grasps the file a little farther up, so that if the wrist is turned slightly away, no injury will result even though the file receive a blow on the end. Filing without a handle on work in a lathe is most dangerous of all, but is perfectly safe if done in the manner described. Apropos of filing without a handle, it is interesting to note that filing absolutely perfect flat surfaces in a vise is best done without a handle. The extra length of a handle means extra leverage, acting opposite to filing flat.



Manner of Holding a File without a Handle to Prevent Injury to the Hand

Drill Press Used for Light Punching

Having a number of oblong holes to punch in some thin brass strips, I devised a die that was used in a drill press in the manner of a hand bench punch. The die and guide plate A was fastened to a stem, B, that was turned to fit the hole in the drill-press standard. The stem was drilled, as shown by the dotted line C, for releasing the punchings. The guide D passes through the slot E in the die A, so that the whole device may be readily set in the drill press and the punch coincide with the die.—Contributed by A. G. Sherk, Irvington, N. J.



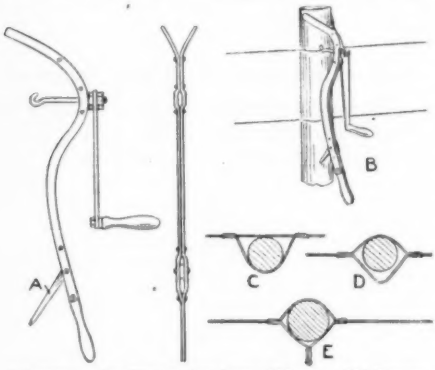
A Die Fitted in a Drill Press for Punching Oblong Holes in the Brass

Test for Leather Belting

Place a small strip of leather in strong vinegar and if it is of a good quality, it will not change, except to turn a darker color; but if the leather is of a poor quality, the fibers will quickly swell and the leather will soon become a gelatinous mass.—Contributed by Frank J. Taylor, Las Vegas, Nevada.

Wire Stretcher

This stretcher is especially adapted to draw wires taut on an old fence, but can be used for ordinary work in



A Stretcher for Tightening Loose Wire on Old Fences, or for Stretching New Wire

putting up a new fence. The handle consists of two pieces of strap iron, about 1 in. in width and 20 in. long, shaped to form a fork at one end and a handhold at the other. A crank, with a shaft and hook, is fitted at the center of the bend, and a projection is pivoted at A. The stretcher, as it is applied to a post, is shown at B. A piece of wire is attached to the main wire around a post, as shown at C, then drawn into the shape shown at D, by the leverage of the handle and the projection A set in the post. This wire is then twisted, as shown at E, until the main wire is stretched tightly.

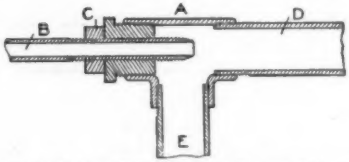
Correcting Typographical Errors in Typewriting

A time-saving arrangement for correcting typewritten manuscript, where pen or pencil alterations are not allowed, has been used by an ingenious stenographer. A set of typewriter type was procured from the type founders who keep in stock fonts for different makes of machines. A little holder was made for each type, for greater convenience in handling, but this can be dispensed with, as a little care in handling the type itself will suffice. Then an ordinary rubber-stamp pad was procured and by using the proper amount of ink a shade similar to the impressions made from the typewriter ribbon was easily obtained. The erroneously printed letter is erased and the correct letter stamped on by using the metal type, having, of course, first pressed the type upon the pad.

Where only one or two letters are to be changed on a page and a large number of pages are to be corrected, a material saving of time can be made, the necessity of putting the sheet in the typewriter and adjusting it in the proper position being obviated. The use of the device is of course restricted to the correction of errors where but few wrong letters have been struck.—Contributed by Geo. H. Thornton, Buffalo, N. Y.

Vacuum Cleaner for Removing Loose Sand from Molds

When setting cores in a sand mold there are always some loose particles that fall into the depressions of the mold which, if not removed, will cause a dirty or ragged part on the finished casting. In some instances these particles fall into places where it is impossible to remove them with a molding tool. I rigged up a device that is giving entire satisfaction and can be used in any part of an irregular mold for drawing out loose particles in the same manner as a vacuum cleaner. The device consists of pipe and fittings, con-



Loose Sand in a Mold is Easier Drawn Out with a Vacuum Than with a Tool

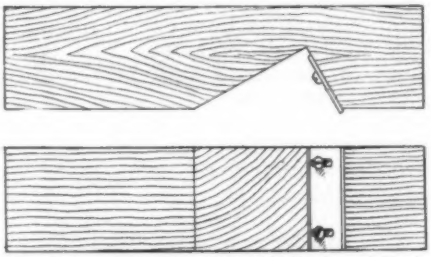
nected as shown and used on an air-pressure line of the shop.

The body of the device is a ¾-in. tee, A, which is fitted with a reducer, C, to admit the end of a ¼-in. pipe, B, having a long thread and a pointed end.

The end of this pipe should extend over the opening in the branch pipe E. The amount of this extension can only be determined by testing it for best results, whereupon the pipe B is fastened permanently with a locknut or a pin. The air rushing through the pipe B causes a vacuum in the pipe E, which is used in the mold. The end of the latter pipe can be fitted with a flexible hose so that it may be more easily handled. The suction set up by this device is sufficient to remove any loose particles from a mold.—Contributed by Eugene J. Desmond, Philadelphia, Pa.

A Hand Scraper for the Woodworker

A very handy scraper, described by a correspondent of the American Carpenter and Builder, is made of a piece

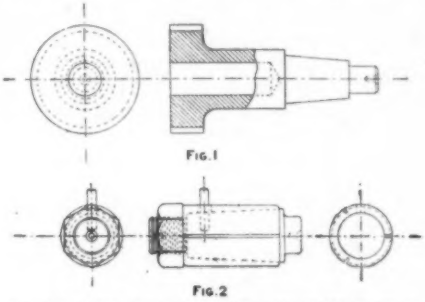


The Scraper is Easily and Quickly Made and Used in a Manner Similar to a Plane

of ordinary ash, 2 in. wide and 6 in. long, with a notch cut in it and a scraper blade fastened with screws in the notch. The blade has slots for the screws instead of holes, so that it may be adjusted for the cut. The notch is located near one end, where the user holds the tool and pushes it along as a plane.

A Small Expansion Arbor

Small gears, as shown in Fig. 1, or similar work, where specifications call for the hole to be ground first and the outside finished last, require a very accurate expanding arbor. Such an arbor, which consists of two parts and a nut for expanding the sleeve, as shown in Fig. 2, can be easily made. The outer part or sleeve is turned to a neat fit in the hole of the work after both surfaces are ground, then it is

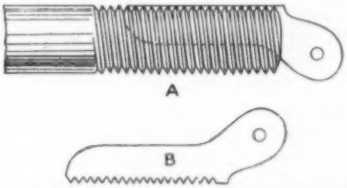


An Expanding Arbor for Holding Small Work That must be Ground Internally Before Finishing

bored tapering. The center, or expanding part, is turned tapering to fit the bore of the sleeve and threaded on the smaller end. A pin is fitted loosely through the sleeve and driven tightly into the center part. This is to hold the parts together and prevent them from becoming lost.—Contributed by C. E. Bradley, Fall River, Mass.

How to Make a Screw-Pitch Gauge

Cut a clean thread with a new die on a bolt and make a slot through the center of the threaded length. Slip the piece of steel to be used for the gauge in the slot, as shown at A, and clamp it in a vise. It is an easy matter to file the threads into the gauge with a new three-cornered file. The metal is then shaped as shown at B. A set of gauges can be made in this manner and attached to a handle. The number of



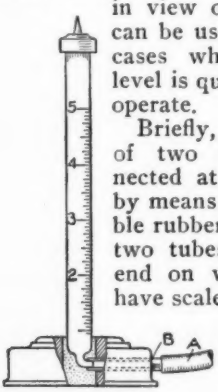
The Threads on the Bolt Make a Guide for Filing the Notches on the Gauge

the thread should be stamped or etched on the gauge.—Contributed by Louis A. Novak, Mahnomen, Minn.

How to Make a Simple Level

By ARTHUR MOORE

The level described in the following article was constructed by the writer and has been exceedingly serviceable in view of the fact that it can be used in a number of cases where the ordinary level is quite troublesome to operate.

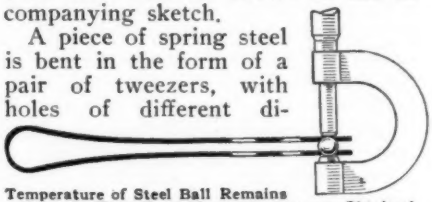


Briefly, the level consists of two glass tubes connected at their lower ends by means of a piece of flexible rubber tubing, A. These two tubes are mounted on end on wooden bases and have scales marked on them, the points on the scale being measured from the under side of the base upon which they are mounted. The tubes and connecting hose are filled with water until it rises about halfway in each tube. Two objects can now be adjusted to the same level by placing one of the tubes on each of them and raising or lowering one of the objects until the liquid is at the same height in both tubes.

The level may be constructed as follows: Obtain two pieces of ½-in. glass tubing about 2½ ft. long. Draw one end of each piece down to at least a ¼-in. diameter, in a gas or alcohol flame, and bend it over at right angles to the main portion of the tube. Cut this small projecting piece off so that the remaining portion projects sidewise beyond the side of the main tube about ⅛ in. Turn, from a piece of hard wood, two pieces, that are to serve as bases, similar to those shown in the sketch. Drill a ¾-in. hole in the top of each of these pieces to a depth about ⅛ in. less than the thickness of the piece. Obtain two short pieces of brass tube, and drill a hole in the side of each of the wooden bases, so that the tube B will fit in it tightly and enter the large opening near its bottom. Place the end of the ½-in. tube with the projection on it in the large opening so that the small projection is in the end of the brass tube, and pour a small quantity of plaster of Paris around it. Hold the glass tube in a vertical position and allow the plaster to harden. A scale may now be marked on the glass tube, or one may be marked on a piece of paper and pasted to the tube. The points on this scale should all be located by measurements from the lower surface of the base. A small cap may be provided for each tube with a sight mounted on it so that the two tubes may be used in running a level line, or leveling a point some distance away. Make sure that the end of the tube is not closed up, as the liquid then could not readily pass from one to the other due to the air pressure. The upper edge of the sights must be the same distance from the lower surface of the base in each case. The glass tubes may be protected by mounting two wooden strips, one on each side, on the wooden base.

Calipering Steel Balls

A method used by a correspondent of American Machinist to caliper hardened steel balls is shown in the accompanying sketch.



Temperature of Steel Ball Remains Normal; Thus True Measurements are Obtained

A piece of spring steel is bent in the form of a pair of tweezers, with holes of different diameters drilled in each side and countersunk on the inside. A ball is placed in a hole suitable to its diameter, allowing it to project so that there is no interference with the calipering.

By using the tweezers the heat of the hand does not cause the ball to expand, thus the true diameter may be easily determined.

Washing Pad for Removing Grease from the Hands

Curled hair, such as used in upholstering the finer grades of furniture, is much better than a brush for removing grease and grime from the hands. It penetrates the crevices of the knuckles and nails, and does not abrade the skin at all. To use, simply take a large handful of the hair, apply soap and wet it, then rub over the hands. It will take several days before the wad assumes the form that gives the best results, but once in shape it will last indefinitely. — Contributed by Mabel Hillyer Eastman, Chillicothe, Mo.

Inserting Packing Leathers

It is sometimes very difficult to get a packing leather started into the cylinder. The soft leather will spread and squeeze out at every attempt to push it and the attached piston into the cylinder.

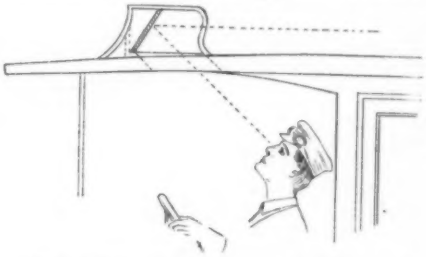
The sketch shows how the leather can be very easily inserted by means of a strip of tin a little larger than the inside circumference of the cylinder. The tin protruding from the opening of the cylinder forms a funnel into which the leather is pressed at all points, thus easily slipping into the cylinder. The tin can be withdrawn with a small pair of pliers. This kink is a time saver when working on all leathers attached to push-up pistons.

Clearing Shellac Varnish

Shellac varnish used in pattern shops has a tendency to hold in suspension impurities that leave dirty streaks on the patterns when the liquid is applied. The liquid can be easily purified by the addition of a few crystals of oxalic acid. The shellac should be stirred, to aid in a thorough mixing, then allowed to settle for several hours. Care should be taken not to use too much acid.

Overhead Location for an Automobile Mirror

The use of a small mirror to reflect a view of the following traffic is fairly common practice, though the location

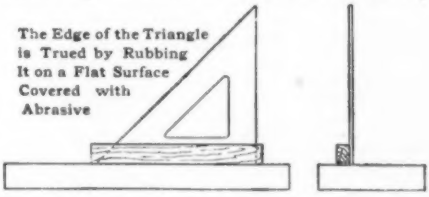


The Mirror Placed on the Roof Makes It Easy to See the Traffic Directly Behind

of such a mirror is not always the best. One difficulty is that traffic close behind a vehicle, equipped with a mirror in the usual position, cannot be seen. In order to obviate this difficulty a driver of a limousine placed the mirror on the roof of the car. The mirror is mounted in a hood which protects it against rain or snow. Through a glass-covered hole in the roof the driver has a good view of the mirror without undue exertion, and the traffic directly behind can be plainly seen.— S. P. McMinn, Brooklyn, N. Y.

How to True Up Triangles

The edges of triangles will become roughened and slightly hollowed out by constant use and must be trued frequently to produce accurate drawings. A very efficient and quick way to true them up is shown in the illustration,



which is easily understood. The abrasive used is a valve-grinding compound that can be procured at any garage.— Contributed by H. M. Briggs, York, Pennsylvania.

Emery-Cloth Ends to Attach in a Hacksaw Frame

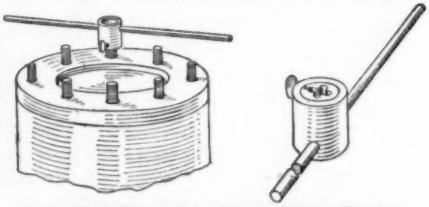
A strip of emery cloth, up to 2 in. in width, can be effectively used in a hacksaw frame, if the ends of the cloth

The Strip of Emery Cloth in the Saw Frame is Used in the Same Manner as a File

are held straight to prevent creasing. This may be accomplished by folding the ends over a piece of broken hacksaw blade, then bending a wire clip, to attach it in the saw frame, over the piece of saw blade, as shown in the sketch. In this way a strip of emery cloth may be used like a file.—Contributed by John Steen, Minneapolis, Minnesota.

A Special Die Holder

In some instances it becomes necessary to rethread a stud so placed that it is impossible to get at it with an ordinary die stock. A stud on a cylinder head, for instance, where there are several located, will require a special die holder to turn the die on the stud that needs a new thread. Many times the threads on these studs become bruised or battered in making repairs, and then, too, it may be necessary to reduce the size of the stud to fit some other nut. A special die holder for rethreading these studs is made of a piece of steel or cast iron, bored at one end to receive the die and drilled for a thumb-

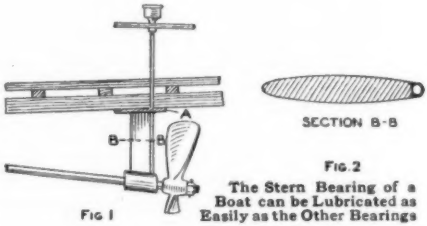


Long Head Diestock for Use in Cutting Threads on a Stud Surrounded by Others

screw. The piece may be of any length and a rod run through a hole drilled in the end opposite the die for a handle.

Lubricating the Stern Bearing of a Motorboat

The usual form of a strut for motorboats provides no means of lubrication for the stern bearing The sketch shows a method by which grease can be very easily fed to the bearing. A piece of ¼-in. copper tubing is cut long enough to reach from the bearing to a point 6 in. above the waterline and the after edge of the strut filed slightly flat. This will make it easier to solder the tube to it. A hole is bored into the bearing of sufficient diameter to receive the tube and another bored through the strut plate A, Fig. 1, the bottom of the boat and the floor. This hole should be small enough to hold the tubing tightly in place. The tube is now forced through the floor, hull and plate, and into the hole in the bearing for a short distance. By tapping very gently with a hammer it can be straightened



The Stern Bearing of a Boat can be Lubricated as Easily as the Other Bearings

out and pressed against the edge of the strut. Both the tubing and strut should be cleaned with muriatic acid or some good soldering flux, after which they can be soldered together. The solder should be run in freely between the tube and the whole smoothed over, as shown in Fig. 2. A little solder should be run around the tube where it passes through the plate in order to make the point water-tight. A grease cup of the kind preferred is attached as shown. When the bearing needs lubrication, a turn or two of the screw cap in the cup forces the grease through the tube into the bearing. If the solder is smoothed over carefully, the resistance will be no greater than before the tube was attached.—Contributed by Olaf E. Tronnes, Evanston, Ill.

To Prevent Dirt from Entering beneath the Finger Nails

Sometimes a person is called to help repair a machine in a shop where there is considerable dirt and grease. An office man can keep the dirt from getting under the nails by filling the space between them and the fingers with soap. After the work is finished, the soap is easily washed out and the nails cleaned.—Contributed by Loren Ward, Des Moines, Iowa.

Combination Side and End Wrench

A very handy all-around wrench can be made by shaping the jaws from a piece of steel—a piece of buggy spring

The Construction of the Jaws Makes a Side and End Wrench of One Piece

will do—as shown in the sketch. The size and thickness of the wrench will depend on its use. This makes a side and end wrench.—Contributed by C. C. Hall, Eureka Springs, Ark.

Writing Pen for the Draftsman

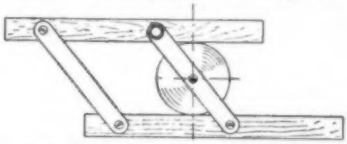
An old, discarded ruling pen can be easily changed into a pen for lettering or writing on tracing cloth by grind-

The Shape of a Ruling Pen to be Used in Writing or Making Letters on Tracing Cloth

ing away that portion of the nibs shown by the dotted lines in the sketch. To obtain best results, the pen must be held in the hand so that the opening in the pen is vertical and not at an angle.—Contributed by Wm. Rosenberg, Watertown, Mass.

Parallel-Rule Center Gauge

A very handy little tool for locating the center of any piece of round, square, octagon or oval stock is made in the manner of parallel rules. The material required is two pieces of hard wood, 4 in. long, ½ in. wide and ⅜ in. thick; two pieces of metal, 3 in. long, ⅜ in. wide and $\frac{1}{16}$ in. thick; three wood screws; one bolt with a knurled nut, and a steel point. The parts are



Lines are Scratched across the Ends of the Stock and Their Intersection Marks the Center

put together as shown in the sketch. This will locate centers on stock from ⅛ in. up to 2 in. in diameter. The method of using the tool is easily understood by the illustration.—Contributed by A. Kerbaugh, Allentown, Pa.

Notch to Locate Slots in an Electric Plug

The electric-light extension cord has grown from a convenience to an actual necessity, and there are many varieties, some with faults, some with virtues, some with both. Of the various kinds of plugs one of the commonest is shown in the sketch.

It is inconvenient to connect one of these plugs in the dark, but, if a groove is cut on an emery wheel in the part shown and the raised lettering removed in the same manner, the brass terminals may be easily inserted in the slots.

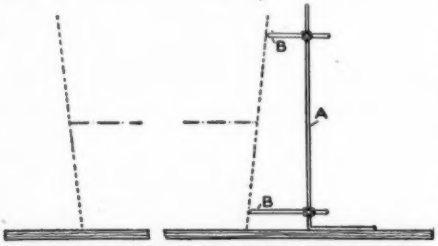
Pipe Tee Made of an Old Valve

An old discarded valve body will serve as a tee in an emergency. The upper portion A is usually tapped to make a fine thread, but this opening can be rethreaded with a pipe tap and a tee fitting will be the result. In some instances a reducing tee may be made of the valve part.

¶The approximate wave length of an aerial may be determined by multiplying the height of the aerial by four.

Lining Up Automobile Wheels

The front pair of wheels on all automobiles are "cut under," or have a slight pitch from ½ in. to 1½ in. If

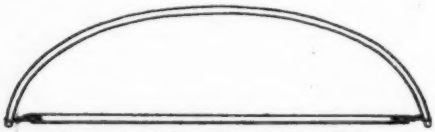


The Pitch of a Wheel is Easily Determined and Its Mate Adjusted to Match It

an axle is bent or twisted in an accident, some means must be employed in the repair shop to get the same "cut-under" to each wheel when straightening the axle. I have used a homemade device which gives the desired results. It consists of a standard, A, to which is attached two sliding pointers, BB. The pointers may be set for any pitch and used in lining up either wheel. The wheels to be lined are placed on a level surface—a straight plank will do—and the device used as shown.—Contributed by T. C. Bevan, Utica, N. Y.

Emery-Cloth Holder for Polishing

The use of a hacksaw frame for holding strips of emery cloth to polish surfaces is a good one, but I find that a decided improvement over this method is to attach the strip of cloth between the ends of a bow. The spring of the wood bow keeps the cloth at a ten-



The Strip of Emery Cloth is Kept Taut between the Ends of a Bow

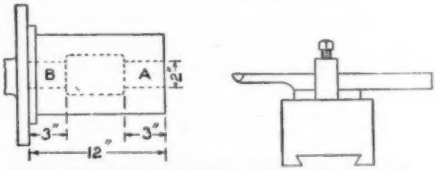
sion and at the same time leaves it sufficient give to allow for inequalities of surfaces and round edges.—Contributed by G. H. Holter, Jasper, Minnesota.

Boring a Deep Hole on a Lathe

When using a boring tool clamped in the tool post of a lathe for boring deep holes, the length of the tool causes it to spring so much that only light cuts can be taken. This makes slow work where there is considerable material to be removed. The following method will hasten the work to some extent.

Instead of setting the tool out far enough to reach the bottom of the hole, set it out far enough to go only halfway. Rough off all the surplus stock with the tool so set, leaving a small amount of material for a finishing cut, then let the tool out and rough the rest of the way, finally taking a finishing cut through the whole length of the hole.

This is well illustrated in the drawing where a casting is to be bored for two bearings A and B. If the tool is set to reach the bottom and used to bore the front bearing, it would not be



Boring One-Half of the Hole with the Tool Set Close in the Tool Post Hastens the Work

very rigid—it would have a 12-in. overhang, while, if set as shown for the first cut and roughing the bearing A, it will have but 3 in. overhang and the job can be proportionately hastened.

Filling Holes in Castings

Defects in castings may be filled with a paste made of 2 lb. of iron borings, 1¼ lb. of dextrine and ¾ lb. of litharge, the whole mixture being colored with lampblack to the desired shade. The iron borings should be sifted. After the parts are thoroughly mixed, add enough water to make a paste. This is applied to the defects and blowholes with a putty knife. When the paste has dried thoroughly, it can be machined just as the metal.

Practical Telephony

By HAROLD HINTON

PART II

Common-Battery System

The central-energy multiple-switchboard system of telephony, usually spoken of as the "common-battery system," is a system whereby all the energy used by the subscribers of each exchange is transmitted from the storage battery in each central office. This storage battery is in turn charged every night by the aid of a motor-generator set in the terminal room of the exchange, or by the aid of a gas or gasoline engine and generator located in the basement of the central office. Modern practice favors a combination of both of these methods of charging, the motor-generator being used whenever possible and the gas-generator set being used in emergency.

The ringing is accomplished through the aid of the ringing machines, of which there are generally two and sometimes three in each office so that one machine does not have to carry all the load and do all the work. These ringing machines are driven by small

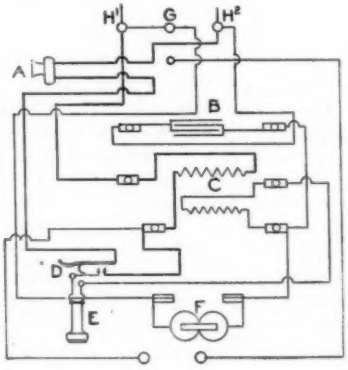


Fig. 9

Connections for a Direct-Line Telephone Where a Common Battery is Used at the Central Office

motors which are connected to them by worm gears. The common-battery system is therefore a vast improvement over the magneto system where each station must have its own battery and hand generator. The connections for a direct line are shown in Fig. 9, in which A is the transmitter; B, condenser; C, induction coil; D, switch

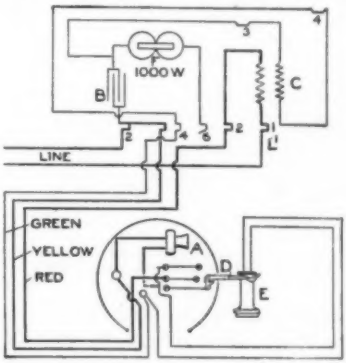


Fig. 10

A Common Wall Set with Connections for a Desk Set on a Common-Battery System

hook; E, receiver; F, ringer; G, ground; and H^1 and H^2, two line wires. A common wall set, with connections for a desk set, is shown in Fig. 10.

The main difference between the magneto and common-battery systems lies in the switchboard and other central-office equipment. The seemingly complicated workings of two common-battery telephones through an exchange to which they belong is clearly shown in Fig. 11. This sketch shows the American Bell telephone method and the Hayes principle of using repeating coils and battery for all line circuits. One operator cord and two subscriber circuits are shown. Normally the circuit between the line wires is closed only through the subscriber's bell and condenser. The alternating current from the ringing machines at the central office can ring the bells through this circuit, but battery current cannot pass on account of the condenser. Each cord circuit has a repeating coil which has four windings.

In the answering or left-hand side of the cord circuit there is one supervisory relay, A^1, which controls the answering supervisory lamp, B^1. This lamp is ⅓ cp., on 12 volts. There is a similar arrangement in the calling or right-hand side. The relays A^1 and A^2 are shunted so that they will not obstruct the voice currents too much. This is done by noninductive resistances, C^1 and C^2, which do not interfere with the proper operation of the relays. When the resistance coil D, which is 80 ohms, and the lamp B^1 are in series across the 24-volt battery E, the lamp will light, but it will go out when the 40-ohm resistance F^1 is connected in parallel with the lamp by the operation of the relay A^1. Normally no current flows through the cut-off relay G^1, and, therefore, the line circuit is closed between H^1 H^2 and H^3 H^4.

When the receiver I^1, at station 1, is removed from the hook, the transmitter J^1 and one winding of the induction coil K^1 form a circuit across the two line wires of a resistance low enough to allow sufficient battery current to flow from E to energize the line relay L, thereby closing its local circuit and lighting the line lamp L^2, which is ⅓ cp., on 24 volts, thus notifying the operator for that line.

The operator inserts the plug into the answering jack belonging to that line, and enough current flows through the relay A^1 to close it, which prevents the lighting of the lamp B^1. The current flows through the relay G^1, thereby breaking the circuit at H^2 through the line relay L, which causes the line lamp L^2 to go out. The operator closes

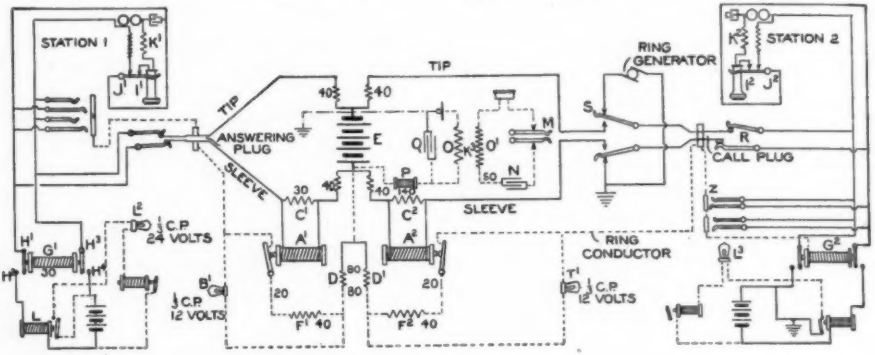


FIG. 11

The Workings of Two Common-Battery Telephones When They are Connected through an Exchange Board in the Central Office, Showing the Course of the Current When the Telephones are Connected by Being Plugged In

the listening key M, and by so doing connects the receiver secondary winding O^1 of the induction coil K^3 and the condenser N across the primary winding O of the coil K^3. The 140-ohm retarding coil P and the primary coil O are thereby connected to the terminals of the battery E. The retarding coil limits the current through each transmitter and enables the current to be supplied to the operators of all the transmitters from one battery without causing cross talk. The condenser Q improves the transmitting qualities by compensating more or less for the inductance of the retarding coil P.

After making the busy test on the desired line the operator, if the line is not busy, inserts the calling plug into the multiple jack R, opens the listening key and closes the ringing key S. The current from the ringing generator flows through and rings the bell at station 2. The current now takes the course through the battery E, the cut-off relay G^2, the resistance F^2, the calling plug Z, the coil D^1 and the supervisory lamp T^1 and closes the relay G^2, which prevents the lighting of the line lamp L^3. When the receiver I^2 is removed from the hook, at station 2, the current flows from the battery E,

through the subscriber's circuit and the relay A^2, connecting F^2 in parallel with T^1, which extinguishes the latter.

When the transmitter J^2 is spoken into, its resistance changes sufficiently to produce a variable current through two of the windings, which induces an alternating current in the other two windings of the repeating coil. This alternating current combined with the direct current from the battery produces a current of variable strength in the line circuit at station 2. This variable current in the winding K^2 of the induction coil induces an alternating current in the other winding of the induction coil, thus producing an alternating current in the local circuit containing the receiver, transmitter and condenser. When the conversation is finished, the lamp T^1 will light up as soon as I^2 is hung up, and L^2 will light up as soon as I^1 is hung up. These are disconnect signals and tell the operator to take down the connection, as the conversation is finished.

Party lines are greatly used by the subscribers on account of the lower rate for this style of service; the two-party line having a lower rate than a direct line, and a four-party line having a lower rate than the two-party. While only one bell, that of the station wanted, is rung at a time, there are two things which are sometimes very annoying to the subscriber, viz., the conversation over a party line is not absolutely private, as is the case with the direct style of service, because the other parties on the line may cut in on the line and listen, and when one party is using the line none of the other subscribers can use it, thereby causing considerable inconvenience, not only to the party called but to the calling party as well.

On each position on the switchboard are strips of ringing keys, one for each cord circuit. The first key has a colored, usually red, button and is used for ringing out on a direct line. The other four keys in the strip have black buttons and are used in their order for ringing out on party lines and ringing the individual bells of the various stations on that line. A four-party phone connection is shown in Fig. 12, which includes the addition of a relay I, and a bias ringer, F. The phones on the four-party line are connected in multiple across the same pair of wires, two of the bells being operated by positive pulsating currents and the other

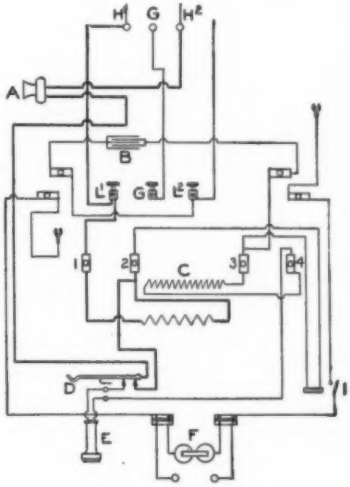


Fig. 12

The Connections for a Telephone in Which Four-Party Phones are on One Line

two, one on either side of the line, by negative pulsating currents, the bells not being in circuit until the relay is actuated. This is accomplished by the operator who, when calling the first station, depresses the first black key in the strip and sends a negative pulsating current down one side of the line through the relay.

When this relay is actuated the bell for that station is brought into the circuit and biased so as to ring with the current. Station 3 on the same side of the line does not receive a ring, as the bell is biased to ring only with a positive pulsating current. The switchboard apparatus for handling these party lines is the same as for direct lines, but the relays must be kept in very close adjustment.

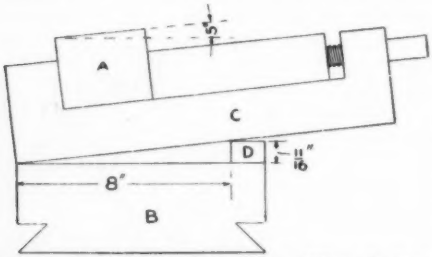
Trunking is a system of connecting two subscribers through two or more

exchanges and is accomplished as follows: Each operator has an "order-wire circuit" with the various exchange names on the buttons. When a call comes in to the operator for a connection outside of her own exchange, which, for example, may be called "Richmond," and the calling station desires line number 571 in another exchange, North, for instance, the Richmond operator presses down the North order button and calls Richmond 571, giving her own exchange name instead of the one originally called for by the subscriber. The incoming trunk operator tests a trunk to see that it is not busy or in trouble, then calls its number to the calling operator who in turn plugs in the subscriber and the connection is made.

(To be continued)

Planing a Sloping Surface on Metal

It is often required to plane a surface of a piece of iron or steel sloping, or at a certain angle, to another side. The usual method is to "cut and try" until



Tilting a Vise Which Holds a Piece Whose Surface is to be Cut Sloping

the correct angle is obtained. A "first-time" method of getting this angle is the following, which also illustrates a simple way of setting up the work.

The block A, as shown in the sketch, is to have one face cut at an angle of 5 deg. with the base. This is a typical case, and it will be assumed that it is done on a milling machine. On the table B of the machine mount the vise C, which has between its jaws the rectangular block, A, with the face to be cut uppermost. Under the vise, and parallel with the side of the machine table, slip a piece of steel $\frac{11}{16}$ in. thick. Several pieces whose combined thickness is $\frac{11}{16}$ in. will also do. Set the inner edge of this piece or pieces 8 in. from the edge of the vise where it rests on the table. A cut taken parallel to the machine table will produce the desired degree of angle.

The thickness of the strip D was determined by the use of the trigonometric formula,

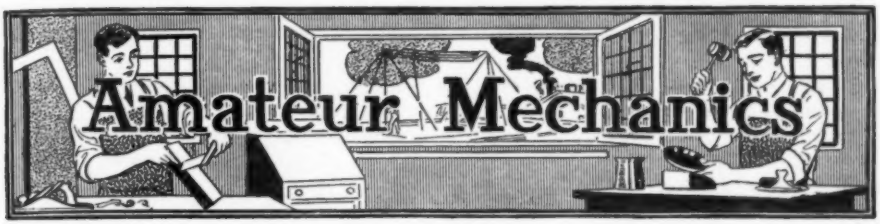
$$\text{tangent} = \frac{\text{side opposite}}{\text{side adjacent}},$$

or, transposed, side opposite = side adjacent × tangent. Substitute the figures, and the side opposite, which is the thickness of strip D, will be found $= 8 \times .08749$, or .699 in. The number .08749 is taken from a table of natural functions. The fraction $\frac{11}{16}$ in. (= .688 in.) is, in this case, near enough to the real value for practical purposes. If greater accuracy is demanded, a few thicknesses of paper could be added.

An Inexpensive Electric Blueprinter

A large glass bottle with a mouth that will admit a 100-watt tungsten electric globe makes a good substitute for the cylindrical blueprinting machine. The drawing, together with the blueprint paper, is wrapped around the outside of the bottle and the electric globe suspended within. The tracing and paper may be held in close contact on the glass with large rubber bands and a sheet of cardboard as a backing. When only a few prints are to be made, the only spare time being at night, this arrangement will prove quite satisfactory.

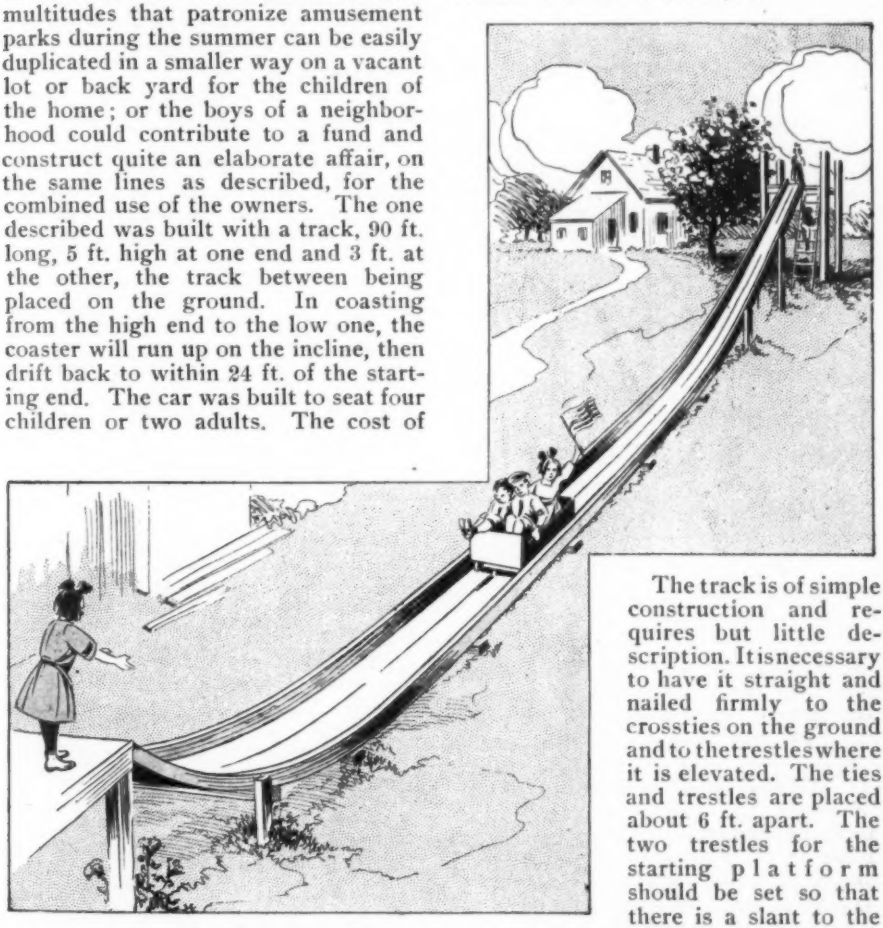
¶Vitriol etching fluid will settle and stick to the bottle, but by placing a few very small pebbles in the solution it is easy to loosen up the settlings and cause them to dissolve again.



A Homemade Roller Coaster

By J. H. SANFORD

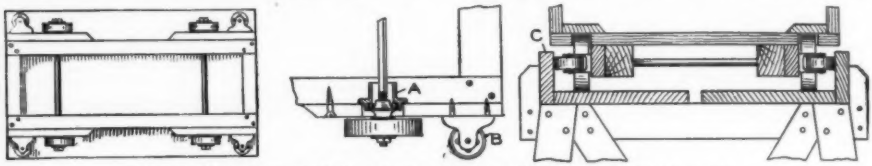
THE popular roller coaster that furnishes untold amusement for the multitudes that patronize amusement parks during the summer can be easily duplicated in a smaller way on a vacant lot or back yard for the children of the home; or the boys of a neighborhood could contribute to a fund and construct quite an elaborate affair, on the same lines as described, for the combined use of the owners. The one described was built with a track, 90 ft. long, 5 ft. high at one end and 3 ft. at the other, the track between being placed on the ground. In coasting from the high end to the low one, the coaster will run up on the incline, then drift back to within 24 ft. of the starting end. The car was built to seat four children or two adults. The cost of all the materials for building this roller coaster did not exceed $10.



Inexpensive Back-Yard Roller Coaster, Suitable for the Enjoyment of the Young as Well as the Older Persons

The track is of simple construction and requires but little description. It is necessary to have it straight and nailed firmly to the crossties on the ground and to the trestles where it is elevated. The ties and trestles are placed about 6 ft. apart. The two trestles for the starting platform should be set so that there is a slant to the track of about 6 in. for starting the car with-

out pushing it. The car can be carried back for starting by adults, but for children a small rope can be used over the platform to draw it back on the track, or a small windlass may be arranged for the purpose.



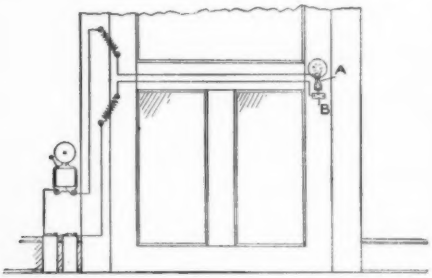
Detail of the Car, Wheels, and the Trestle, Which is Attached to a Tie

The main frame of the car is 3 ft. long and about 13 in. wide, firmly fastened at the corners. The axles for the wheels are machine steel, 19 in. long, turned up on the ends and threaded in the manner of a bicycle axle to fit parts of bicycle hubs, attached to the main frame as shown at A. The wheels are solid, 4 in. in diameter and 1 in. thick, and are set on the bicycle cone of the ball cup, after they are properly adjusted, and securely fastened between washers with a nut on the end of the axle. Guide wheels, B, are placed on the sides in the manner shown. These wheels are ordinary truck casters, not the revolving kind, 2 in. in diameter.

About ½-in. clearance should be provided between the guide wheels B and the guard rail C, on the track. When the car is made in this manner it runs close to the track and there is no place where a child can get a foot or hand injured under or at the sides of the car. The one described has been used by all the children, large and small, for a year without accident.

Door-Bell Alarm

A simple door-bell alarm for informing one when the door of a shop or dwelling is opened is shown in the accompanying sketch. It consists of a piece of spring brass, A, bent into a circle in the center so that it may be clamped on the doorknob bar by means of a small bolt or screw. The two ends of this piece should be separated as shown and a second piece, B, mounted on the door so that its outwardly projecting end is between the ends of the piece A. One terminal of an ordinary vibrating bell circuit is then connected under the head of the clamp screw, and the other terminal under one of the screws holding the piece B in place on the door. It is now obvious that the bell circuit will be completed and the alarm sounded when the knob is turned. Make sure that the piece A is bent so that the circuit is completed before the latch has moved a sufficient amount to allow the door to open.



Wiring Diagram and Connections to an Electric Bell That Rings When a Door Knob is Turned

The circuit leading to and from the switch may be completed through the hinges of the door, but it would be better to use small coil springs as shown. There would then be no likelihood of the circuit being open at any time, which might occur if the hinges were used.

¶ Discolored coffee and teapots may be restored to their original brightness by boiling them a few minutes in a solution of borax water.

A Jardinière Pedestal

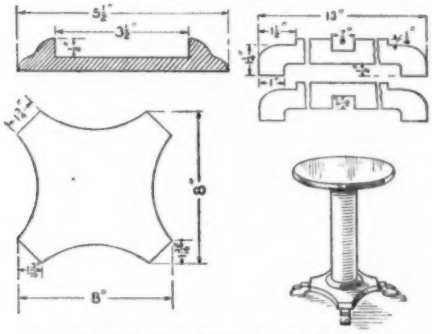
The pedestal may be made of any close-grained wood, such as basswood or maple, if the stain is to be walnut or mahogany, but it can also be constructed of quarter-sawed oak and finished in a waxed mission or varnished surface. The material required is as follows:

1 top, 12 by 12 by ⅞ in., S-2-S.
2 caps, 6 by 6 by ⅞ in., S-2-S.
1 upright, 18 by 4 by 4 in., S-4-S.
1 base, 8 by 8 by ⅞ in., S-2-S.

The top is centered and a circle, 11½ in. in diameter, is drawn upon it, and sawn out. The caps are also centered and circles drawn upon them, 5½ in. and 3½ in. in diameter. Saw them out on the larger circles and center them in a wood lathe and turn out the wood in the smaller circles to a depth of ½ in. The upright is then centered in the lathe and turned to 3½ in. in diameter for its full length.

The base and foot pieces are cut out as shown, fitted together and fastened with screws from the under side. One of the caps is mounted in the center on the base and the other cap in the center on the under side of the top. The upright is then placed in the turned-out parts of the caps and either glued or fastened with screws.

If light wood is used, the finish can be walnut or mahogany. A very

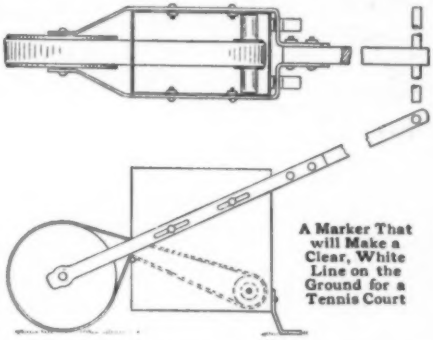


The Pedestal can be Made of a Wood Suitable for Finishing to Match Other Furniture

pretty finish can be worked out in pyrography, if one is familiar with that work.—Contributed by Russell T. Westbrook, Dover, N. J.

A Lawn-Tennis Marker

The liquid receptacle is a metal biscuit box, about 9 in. square and mounted on a wheel with a handle, the



A Marker That will Make a Clear, White Line on the Ground for a Tennis Court

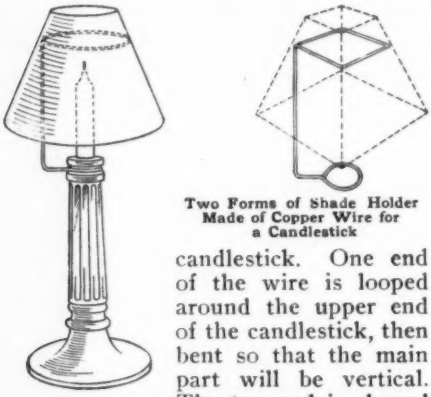
whole being similar to a wheelbarrow. The wheel is 7 in. in diameter and 2½ in. thick. The wheel and box are bolted between two pieces of strap iron in the manner shown, and the handle is attached back of the box. If the box is of very thin metal, boards should be placed within on the sides where it is fastened to the strap iron. A roller is pivoted in the box at the lower back corner and a canvas tape or band run over the roller and wheel in the manner of a belt. The tape should run through a slot cut in the front part of the box, about midway between the top and the bottom. The edges of the tin in the slot must be turned over and hammered down to make a smooth surface for the tape to run over.—Contributed by George N. Bertram, Toronto, Can.

Removing Tannin Stains from Teacups

A small portion of hyposulphite of soda mixed with vinegar will make a good cleaner for teacups having tannin stains. This process does not injure the finest china and is inexpensive. The same solution works quite well on clothes that are accidentally stained with tea. They should be washed out and dried quickly after its application in order to make this method most effective.—Contributed by Loren Ward, Des Moines, Iowa.

A Candle-Shade Holder

A holder for either round or square shades can be easily constructed from a piece of heavy copper wire to fit on a



Two Forms of Shade Holder Made of Copper Wire for a Candlestick

candlestick. One end of the wire is looped around the upper end of the candlestick, then bent so that the main part will be vertical. The top end is shaped into a circle 2 in. in diameter or a square having sides 2 in. long, as desired.—Contributed by Harry Slosower, Pittsburgh, Pa.

Wire Mesh Used as a Shelf

In covering a window back of my lathe with wire mesh as a protection I also made a shelf for the tools between the window sill and the lathe bed of the same material. The mesh used was ¼-in. The shelf is always clean, as the shavings and dirt fall through, and the tools may be readily picked up.—Contributed by J. H. Sanford, Pasadena, California.

Heel Plates

A good heel or toe plate can be made by driving ordinary thumb tacks into the leather of the shoe heel or sole. The shape can be varied by using tacks

The Heads of the Tacks Form a Wearing Surface Equal to an Ordinary Heel Plate

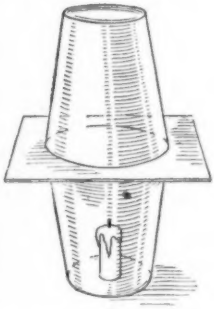
having different-sized heads.—Contributed by James T. Gaffney, Chicago, Ill.

A Bright Dip for Metal

Articles of brass, copper and bronze may be given a bright luster by dipping them into a solution composed of 50 oz. of nitric acid, 25 oz. of sulphuric acid, liquid measure, and ½ oz. of soot and ½ oz. of salt, by weight. After the articles are dipped into the solution they are removed and thoroughly washed, then dried in sawdust to prevent streaks.

An Interesting Vacuum Experiment

A very interesting experiment may be performed with two drinking glasses, a small candle end and a piece of blotting paper, says the Pathfinder. The glasses must be the same size and of the thin-glass kind. The candle end is lighted and set in one glass; the blotting paper is well dampened and placed on top of the glass, and the other glass inverted and its rim placed exactly over the lower one and pressed down tightly. The candle will burn up all the oxygen in the glass and go out.



The air in the glass being heated will expand and some of it will be forced out from under the moist paper, and then, as the portion remaining cools, it will contract and draw the upper glass on the paper and make an air-tight joint. The upper glass can then be taken up and the lower one will cling to it.

A Sliver Extractor

If a clipper for the finger nails becomes dull do not throw it away, but keep it in the tool box in a handy place. It is very useful for extracting slivers from the flesh.—Contributed by G. Wokenfuss, McCook, Neb.

An Electric Anemometer

By Wm. H. DETTMAN

The construction of this instrument is so simple that any amateur can make one, and if accurate calibrations are desired, these can be marked by comparison with a standard anemometer, while both are placed in the wind.

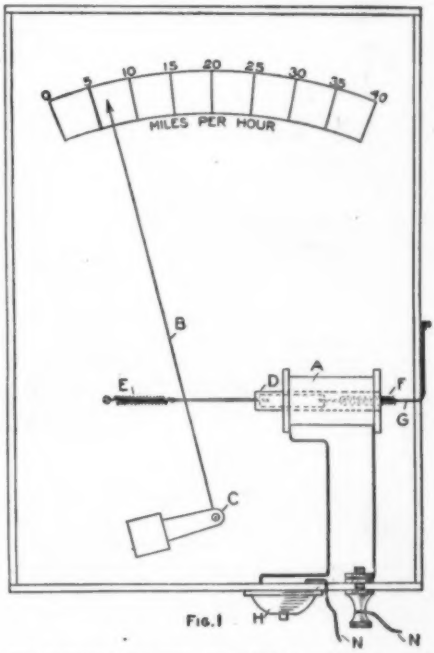
The Indicator

The case of the indicator is built of thin wood—the material of an old cigar box will do—9 in. long, 6 in. wide and 1½ in. deep. If cigar-box material is used, it must first be soaked in warm water to remove the paper. If a cover is to be used on the box, a slot, on an arc of a circle, must be cut through it to show the scale beneath. The arc is determined by the length of the needle from a center over the axis on which the needle swings. When the box is completed, smooth up the outside surface with fine sandpaper and give it a coat of stain.

The core of the magnet is made by winding several layers of bond paper around a pencil of sufficient size to make an inside diameter of slightly over ¼ in., and a tube 2 in. long. Each layer of the paper is glued to the preceding layer.

Two flanges or disks are attached to the tube to form a spool for the wire. The disks are cut from thin wood, 1¼ in. square, and a hole bored through their centers so that each will fit on the tube tightly. One of them is glued to one end of the tube and the other fastened at a point ½ in. from the opposite end. The space between the disks is filled with seven layers of No. 22 gauge insulated magnet wire, allowing sufficient ends of the wire to project for connections. The finished coil is located in the box, as shown at A, Fig. 1.

The core for the coil is cut from a piece of ¼-in. iron rod, 1¼ in. long, and a slot is cut in each end, ¼ in. deep, into which brass strips are inserted and soldered, or otherwise fastened. The strips of brass are $\frac{3}{16}$ in. wide, one 1½ in. long and the other ¾ in. Two $\frac{1}{16}$-in. holes are drilled in the end of the long piece, and one $\frac{1}{16}$-in. hole in the end of the short piece. The complete core with the brass ends is shown in Fig. 2.



The Indicator Box with Coil, Needle and Scale, as It is Used in Connection with the Anemometer

The needle B, Fig. 1, is made of a copper or brass wire, about 6 in. long, and is mounted on an axis at C. The detail of the bearing for the axis is shown in Fig. 3. The axis D is a piece of wood fitted in the U-shaped piece of brass and made to turn on brads as bearings, the center being pierced to receive the end of the needle. After locating the bearing for the axis C, Fig. 1, it is fastened in place so that the upper end or pointer of the needle will travel over the scale. The needle is then attached to the bearing after having been passed through the inner

hole of the longer brass strip of the core, and the coil is fitted with the core in the manner shown at D. A light brass coil spring is attached to each end of the core, as shown at E and F, the latter being held with a string, G,

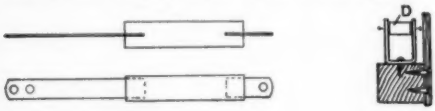


Fig 2 Fig. 3

The Metal Core for the Coil and the Bearing Block for the Axis of the Needle

whose end is tied to a brad on the outside of the box, for adjustment. A better device could be substituted by attaching the end of the spring F to a nut and using a knurled-head bolt passed through the box side. One of the wires from the coil is attached to a push button, H, to be used when a reading of the instrument is made. The connections for the instrument consist of one binding post and a push button.

The Anemometer

The anemometer resembles a miniature windmill and is mounted on top of a building or support where it is fully exposed to the air currents. It differs from the windmill in that the revolving wheel is replaced by a cupped disk, A, Fig. 4, fitted with a sliding metal shaft, B, which is supported on crosspieces, CC, between the main frame pieces DD. The latter pieces carry a vane at the opposite end. The frame pieces are ½ in. thick, 2¼ in.

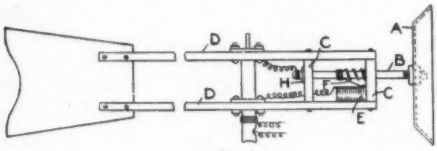


Fig. 4

The Anemometer as It is Mounted on a Standard Similar to a Small Windmill Weather Vane

wide and 36 in. long, and the crosspieces have the same width and thickness and are 4 in. long.

A variable-resistance coil, E, is made as follows and fastened in the main frame. The core of this coil is a piece of wood, 2 in. square and 4 in. long, and wound with No. 18 gauge single-wound cotton-covered german-silver wire. The winding should begin ¼ in. from one end of the core and finish ¼ in. from the other, making the length of the coil 3½ in. The ends of the wire are secured by winding them around the heads of brads driven into the core. A small portion of the insulation is removed from the wire on one side of the coil. This may be done with a piece of emery cloth or sandpaper. A sliding spring contact, F, is attached to the sliding shaft B, the end of which is pressed firmly on the bared portion of the wire coil. One end of a coil spring, which is slipped on the shaft between the pieces CC, is attached to the end crosspiece, and the other end is fastened to the sliding shaft so as to keep the shaft and disk out, and the flange H against the second crosspiece, when there is no air current applied to the disk A.

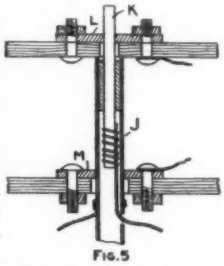


Fig. 5

The insulation of the standard upon which the anemometer turns is shown in Fig. 5. The standard J is made of a piece of ½-in. pipe, suitably and rigidly attached to the building or support, and the upper end, around which the anemometer revolves to keep in the direction of the air currents, is fitted with a plug of wood to insulate the ¼-in. brass rod K. A bearing and electric-wire connection plate, L, is made of brass, ⅛ in. thick, 2 in. wide and 4 in. long. The bearing and connection plate M are made in a similar manner. The surface of the holes in these plates, bearing against the pipe J and the brass rod K, make the two connections for the wires from the variable-resistance coil E, Fig. 4, located on the main frame, to the wire connections between the two instruments. These wires should be weather-proof, insulated, attached as shown, and running to and connecting

the indicator with the anemometer at NN, Fig. 1.

Two or more dry cells must be connected in the line, and when a reading is desired, the button H, Fig. 1, is pushed, which causes the current to flow through the lines and draw the magnet core D in the coil, in proportion to the magnetic force induced by the amount of current passing through the resistance in the coils on E, Fig. 4, from the contact into which the spring F is brought by the wind pressure on the disk A.

How to Make Stick Shellac

It is often desired to use shellac in solid or stick form, and to get it into this shape by melting and molding requires considerable time. A much quicker method is to place the shellac in a shallow box, spread it out in a thin layer and play the flame from a Bunsen burner upon it until the mass is melted and run together. Allow it to stand a few seconds, then, with moistened fingers, fold it over and over and shape it with the fingers. It is possible to make a stick 8 or 10 in. long and 5/8 in. in diameter in about 5 minutes.—Contributed by J. H. Beeber, Rochester, N. Y.

Substitute for a Hose Reel

Not having the room to spare for the ordinary hose reel, I used as a substitute a piece of wire bent into the shape of a letter S and with its aid coiled the hose in a manner to expel the water and leave it in shape for storing.

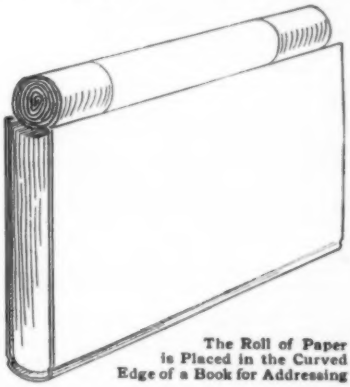
The hook A is sprung around the hose about 5 ft. from the connection joint and remains there permanently. The end of the hose with the connection C is then brought around in a circle and forced into the hook B. This forms the start for the coil and

A Hook for Coiling a Hose Instead of Turning It on a Reel

the hose is easily rolled up to the nozzle, the water being expelled during the operation.—Contributed by F. H. Aldrich, Toledo, Ohio.

Addressing a Roll of Papers

When addressing rolled-up papers it is difficult to write on the curved surface. The papers also have a tendency



The Roll of Paper is Placed in the Curved Edge of a Book for Addressing

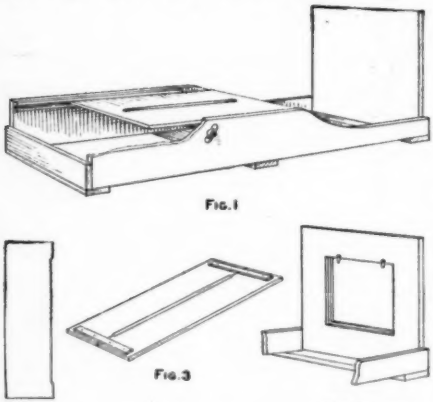
to roll away. By placing the roll in the hollow on the front edge of a large book, as shown in the sketch, it will be found easy to write on the wrapper.—Contributed by W. P. Shaw, Toronto, Canada.

Repairing the Bruised Sides of a Motorboat

When the sides of a boat become scored or bruised scrape the parts clean and fill the depressions with wood cement. The wood cement or stick cement, as it is called, can be procured from a paint store. Heat the cement with a blowtorch and apply it to the bruised parts. Use a heated putty knife to smooth the cement and make the surface level. After sandpapering the fills and applying a coat of paint the boat sides will look as good as new. The cement will not chip or fall out.—Contributed by Henry Beck, Bronx, New York.

Copying Stand for Photographic Enlarging and Reducing

A camera stand or table, which can be put to many uses, is easily made and, when made, will be of particular service, says Work, London, for en-



Camera Stand for Use in Copying and Enlarging, as Well as for Making Lantern Slides

larging, reducing, copying, and, with a slight modification, for making lantern slides by reduction.

Copying with a camera on a tripod is always a more or less complicated job, because of the ease with which a picture, being focused, may be thrown out of focus, and even out of the field of view, the camera not being attached to the same support as the picture. With the stand shown in the illustration, the picture is attached to the same support as the camera. This makes it possible to place the apparatus on a table, out in the open, or in any other suitable position, where the light may be best for the work. When used for enlarging with artificial light it will also be found convenient, as it may be placed in any position in a darkened room.

The size of the stand will depend on the sizes of pictures to be made, but it is better to have it too large than too small, as a small camera can be used on a large stand while a small stand would be of only limited use. The general appearance of the stand is shown in Fig. 1. The material list is as follows:

2 Sides, ½ in. by 9½ in. by 5 ft., S-2-S.
4 Crosspieces, ½ in. by 3 in. by 1 ft. 7 in., S-2-S.
4 Guides, ¾ in. by 1¼ in. by 2 ft. 6 in., S-2-S.
2 Bottom Pieces, 1 in. by 9 in. by 2 ft. 6 in., S-2-S.
1 Easel, ¾ in. by 1 ft. 6 in. by 2 ft., S-2-S.
2 Cleats, ½ in. by 1½ in. by 1 ft. 4 in., S-2-S.

Straight-grained soft pine or poplar is the best material to use. The side pieces should be narrowed at one end or to a point about halfway of their length. The extent of this narrowing will depend somewhat on circumstances. The guide pieces are then attached with screws, the two upper pieces so that they have their upper edges flush with the edges of the side boards.

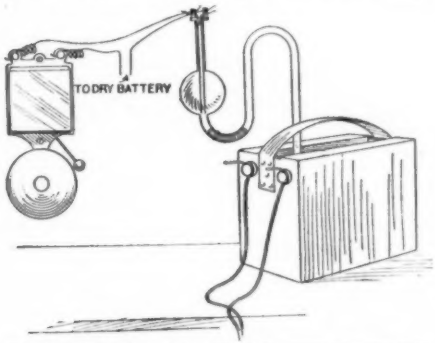
The bottom piece, on which the camera is to be set, is made of the two pieces, cut as shown in Fig. 2, and joined with cleats, as in Fig. 3. The space left after part of one side of each board has been cut away, should be sufficient to make a slot which, when the boards are joined together, will admit the screw to hold the camera in place. A rod is run through holes bored in the sides, just below the two pairs of guides, and fitted with a wing nut for clamping the sliding bottom when a focus and the size of the picture is found.

In copying, the camera is attached to the bottom board and the picture is tacked to the easel. The camera is then focused roughly by means of the rack and pinion, the final, fine focusing being done by moving the sliding bottom board. For enlarging, the lantern is placed on the sliding bottom and the bromide paper tacked to the easel.

For lantern-slide work, which is reducing, it is necessary to cut an aperture in the easel, after the manner shown in Fig. 4. The edges of the opening have a rabbet to receive first a ground glass and then the negative, both being held in place with turn buttons. It is not necessary to have two easels, as this opening can be fitted with a piece to make a level surface when the apparatus is used for copying or enlarging.

Alarm to Designate a Filled Storage Battery

When a storage battery is recharged, the completion of the recharging is marked by the development of gas in the cell. This fact is the basis of a simple electrical device which will ring a bell when the battery is fully charged. A glass tube bent as shown and having a small bulb near its upper end is inserted in the top of the cell, a small quantity of mercury being first introduced in the bend below the bulb. Wires extend down the upper tubing to within a short distance of the mercury. These wires are connected with binding posts so mounted that they can rest on top of the tube, whereupon the bell circuit is completed as shown. Small quantities of gas may develop

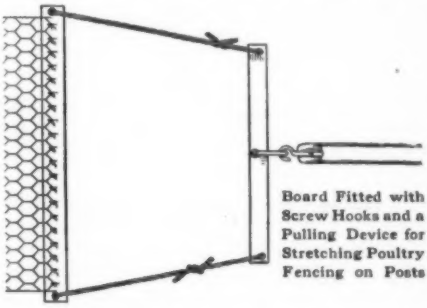


The Gas Generated by a Filled Storage Battery will Make Electric Connections and Sound an Alarm

during the charging of the cell, but if a small hole is pierced in the tube between the mercury and the cell, this gas will not exert pressure enough on the mercury to push it up and connect it with the wires, which will take place first when the development of gas becomes very active at the completion of the recharging.

Stretching Poultry Fencing

The woven-wire poultry fencing is an unusually difficult thing to handle and fasten on posts so that it will be taut and evenly stretched. The best method I have ever seen for drawing this fencing and holding it for nailing to a post is the use of the device shown in the sketch. It consists of a board, as long as the fencing is wide, with

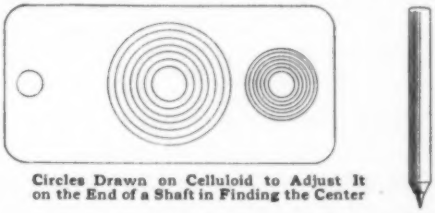


Board Fitted with Screw Hooks and a Pulling Device for Stretching Poultry Fencing on Posts

screw hooks set far enough apart to catch into the meshes of the wire, and a crosspiece attached to the board by pieces of rope at the ends and provided with a pulling loop in the center.—Contributed by Joseph C. Laackman, Meadow Brook, Pa.

A Centering Gauge

The centering gauge consists of a piece of celluloid on which several circles are drawn having different diameters, but all drawn from the same center. A small hole is made at the center to admit the point of a center punch. Two sets of circles may be drawn on one piece as shown, but the lines should be spaced far enough apart to allow the metal to be clearly seen through the celluloid. The sheet is placed on the end of a shaft and adjusted so that a ring will match the circumference of the shaft, then the center punch is set in the center hole

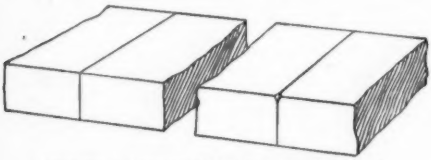


Circles Drawn on Celluloid to Adjust It on the End of a Shaft in Finding the Center

and struck with a hammer. The center punch for marking is shown in the sketch.—Contributed by Harry Holst, San Francisco, Cal.

Starting a Saw Cut

A fine piece of woodwork is often spoiled by the amateur craftsman when starting a cut with a saw. As the



Starting a Saw on a Knife Cut will Prevent Roughing or Splintering the Edge

first stroke of the saw on the edge of the board is made, the teeth often break a splinter from the edge or the saw jumps to one side of the line, thereby making a rough and uneven cut. This can be avoided in a very simple way.

After marking the line, take a sharp knife and make a cut across the edge, as shown, and draw the knife down well over the corners of the board for about 1/8 in. Place the saw on the cut and start it slowly. The saw blade will follow the cut of the knife blade.

A Substitute Penholder

One evening when my wife was using the only penholder in the house I desired to do some writing and being in a hurry, I hastily made a substitute

The End of the Pencil as It is Prepared to Receive the Pen

holder of a pencil. Two cuts were made in the butt end, as shown; the pen was then slipped in, the outside wound with a rubber band, and my penholder was complete.—Contributed by H. A. Sullwold, St. Paul, Minn.

Protecting Binding Posts on Wet Batteries from Corrosion

When recharging the cells of a wet battery it is best to procure the best grade of sal ammoniac, the kind that is put up in boxes having a sufficient amount for one cell. Then, before putting the solution into the cell, melt some paraffin used for preserving purposes and dip the upper end of the carbons, zinc, and the glass jar in it. This will apply a coat of insulating wax that will prevent any white deposit from working up on the parts and corroding the binding posts, or terminals.

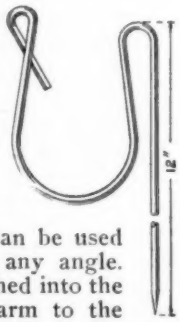
The cells are then filled in the ordinary manner, after which the carbons and zincs are raised just far enough to admit a layer of common machine oil, about 3/8 in. thick. The oil not only prevents evaporation but aids greatly to keep the uncovered parts from corrosion.—Contributed by L. R. Kelley, Philadelphia, Pa.

A Cork Puller

A very simple and easy way to remove a stopper from a bottle, when a cork puller is not at hand, is to press two nails into the cork, as shown in the sketch, and, taking a firm hold on both nails, draw the cork out. Brads may be used on smaller corks. Large and tightly fitted corks may be drawn by gripping the nails with a pair of pliers.—Contributed by W. A. Jaquythe, Richmond, Cal.

Holder for a Garden-Hose Nozzle

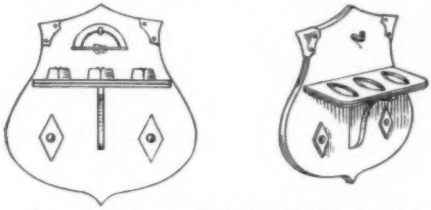
When sprinkling a lawn with an automatic spraying device on a hose nozzle it is necessary to have some kind of an arrangement to tilt the end at the proper angle. I find that a holder made of a heavy piece of galvanized wire bent in the shape shown can be used to set the nozzle at any angle. The wire is easily pushed into the earth and does no harm to the lawn.—Contributed by T. J. Ingram, Jr., Lynchburg, Va.



Holder for a Set of Sadirons

A very attractive holder for a set of sadirons and their handle can be made as shown in the illustration, although the design may be changed if desired. The holder consists of a shield-shaped back, which is fastened to the wall in a convenient place and has a shelf with openings for the irons attached to it. The shelf is made in two pieces, the bottom part being covered with a heavy piece of tin while the upper is cut out to receive the irons.

The irons are placed on the upper piece in such positions that they will be attractively displayed and evenly located, and then a lead-pencil mark is drawn around their base. Openings are cut in the wood on these marks and the board fastened on top of the tin-covered shelf. An ordinary brass



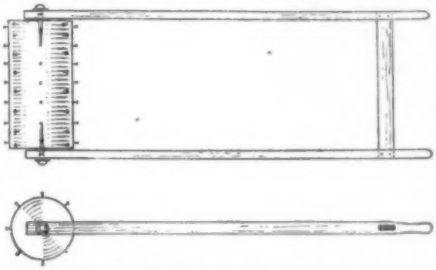
An Ornamented Bracket Shelf for Holding a Complete Set of Sadirons and Their Handle

bracket is used in the center beneath the shelf, to keep it from sagging.

The shield is fastened to the wall with two screws, over which two brushed-brass, diamond-shaped pieces are fastened with large brass tacks, to cover the screw heads. The corners of the shield may be ornamented with brushed-brass designs, and the wood finished as desired. The irons can be set in the holder while hot without fear of burning any part, and they will present a very neat appearance.—Contributed by G. E. Martin, Hastings, Nebraska.

A Garden Roller

A garden roller for digging the earth and crushing clods is easily made of the following material: One round piece of wood, 10 in. in diameter and 18 in. long; two pieces of wood, each 56 in. long, 2½ in. wide and 1¼ in. thick; one piece, 21 in. long, 2 in. wide and 1 in. thick; two ½-in. lag screws, 6



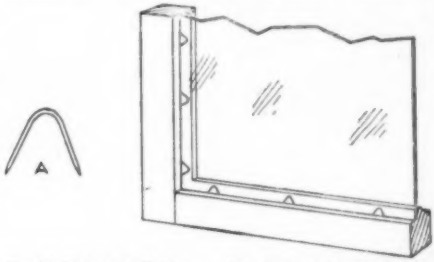
A Roller for Crushing Clods and Digging the Earth in Garden Making

in. long, and a quantity of 8-penny nails.

The short piece of wood is fitted between the two long pieces with tenon-and-mortise joints to serve as a handle at one end and the roller is fastened between the side pieces at the opposite end to revolve on the lag screws. The nails are driven into the roller so that they project about 1 in.

A Substitute for Glaziers' Points

Ordinary small staples make good substitutes for glaziers' tacks. The points of the staples should be drawn apart slightly, as shown at A, to give them a greater holding area and at the same time make them easier to drive. These points seem to hold the glass better than the regular glaziers' points,



Double-Pointed Tacks, or Staples, with the Points Spread, Used as Substitutes for Glaziers' Points

consequently the putty will not crack and loosen, and renewing is avoided. —Contributed by Edward Sieja, Chicago.

PATENTS, PRACTICAL OR UNIQUE

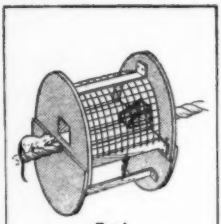


Fig. 1

RAT TRAP FOR SHIPS' HAWSERS (Fig. 1)—The usual means employed to keep rats from getting onto a ship by way of the mooring hawsers is an ordinary disk, over which they cannot pass. Here is not only an obstacle, but a trap as well.

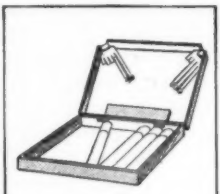


Fig. 2

CIGARETTES AND MATCHES IN ONE BOX (Fig. 2)—In each of the two outer corners of the cover of this cigarette box are five paper matches, which are torn off as required, and ignited by scratching on the striking surface provided.

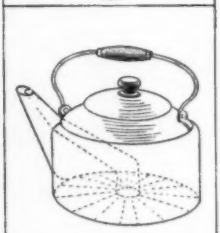


Fig. 3

QUICK-BOILING TEAKETTLE (Fig. 3)—Up through the center of this teakettle is a tubular passage which terminates at the upper side of the spout opening. This is open at the bottom, allowing the heat of the fire to pass up into it, thus providing additional heating surface and bringing the water to a boil much quicker than does the ordinary kettle.

Fig. 4

ELECTRICALLY ILLUMINATED PLUMMET (Fig. 4)—There are conditions under which a steady illumination of the plummet is desirable, such, for instance, as in surveying on dark days. Here is a dry-battery electric lamp arranged in such manner as to throw its light downward upon a pair of plummets.

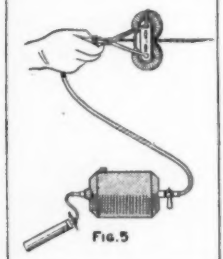


Fig. 5

WIRE-PAINTING BRUSH (Fig. 5)—An interesting device for painting horizontal wires, cable, and the like, is here shown. Air is pumped into the paint reservoir, the pressure forces the paint through the tube into the handle, and thence to the upper rotary brush. The two rotary brushes run on the wire or cable like a pair of trolley wheels.

Fig. 6

SUN-SHIELD FOR THE NOSE (Fig. 6)—Believing that there are enough noses of a kind that will not stand exposure to the summer sun without turning a decided red, an eastern inventor has designed a pair of sun goggles provided with a shield for this important member. The shield is composed of springy material and is provided with clips for holding it to the nose, serving, in turn, as a support for the goggles.

Fig. 7

WATER AND SLOP CARRIER (Fig. 7)—A pushcart for carrying pails of water or slops is here shown. The pails are placed on the underhung frame or platform, and a movement of the lever forces the large cover downward, covering the pail or pails and thus preventing dislodgment or spilling.

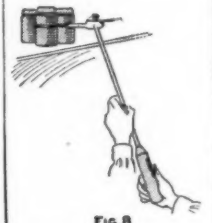


Fig. 8

FRUIT-JAR LIFTER (Fig. 8)—Every fairly well-to-do housewife in farming communities and small cities has, or should have at least, shelf upon shelf of canned fruits, pickles, and the like, for winter consumption. Such families also have a boy or two, and as the top shelves are usually out of the reach of persons less than 6 ft. tall, the fruit-jar lifter here shown simplifies matters. In the handle is a mechanism for clamping the lifting end of the device securely around the jar to be lifted.

Fig. 9

HOT-WATER BOTTLE HEATED BY ELECTRIC LAMP (Fig. 9; British patent)—A hot-water bottle, the contents of which can be kept at the required temperature by inserting an electric lamp bulb and socket into a chamber in its base is here shown.

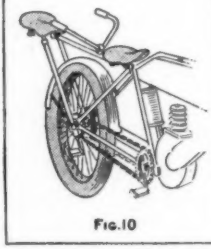


Fig. 10

TANDEM ATTACHMENT FOR MOTORCYCLES (Fig. 10)—This tandem attachment comprises an auxiliary frame pivotally connected at its forward end to the frame of the motorcycle. Tub-

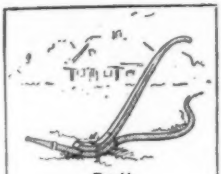


Fig. 11

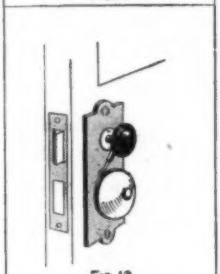


Fig. 13

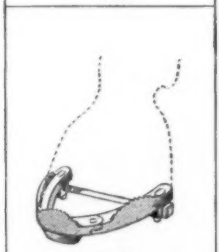


Fig. 15

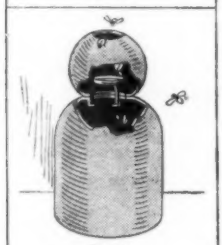


Fig. 17

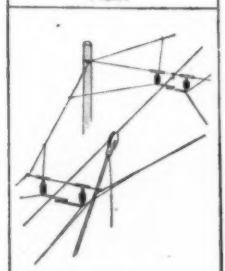


Fig. 19

ular stays containing coil springs support the rear, and handlebars and foot rests are provided. The whole weight of the passenger is spring-supported.

HOLDER FOR GARDEN HOSE (Fig. 11)—By using the hose holder here shown, it is a simple matter to change the position of the hose on the lawn or in the garden without having to stoop over or wet and soil the hands.

EXERCISING DEVICE FOR CHILDREN (Fig. 12)—The use of a dining-room table as an exerciser for small children, the child walking around and around, revolving it as a horse revolves a capstan in house moving, is what one inventor contemplates. The table pedestal is swiveled.

BURGLAR-ALARM BELL FOR DOORS (Fig. 13; British patent)—The handle and key of this door are joined by chain links, and the bell rings should anyone on the outside of the door attempt to turn the knob or the key.

CLOTHESLINE PULLEY (Fig. 14)—With the housed-in pulley here shown there is no danger of the line slipping off the wheel and becoming tangled and twisted when not in use. The line is removed from the posts by simply slipping the pulleys off the post hooks.

NAILLESS HORSESHOES (Fig. 15; British patent)—This nailless horseshoe is composed of two parts, hinged together and made fast at the rear by a bolt and nut. This shoe is held to the horse's hoof by means of tooth-edged clips, the teeth of which take hold on the sides of the hoof when the bolt at the rear is screwed tight.

INDIVIDUAL TOWELS (Fig. 16)—In states or cities where the law prohibits the use of a common towel this device may be found useful. The user lifts a clean towel out of one or the other container, uses it, and then lets it drop, the rod to which it is attached depositing it in the soiled towel receptacle underneath. With such a device towels cannot very well be used twice, or be carried away.

FLY POISONER (Fig. 17)—In the hollow head of this fly trap is a receptacle containing poison. The flies enter through the opening in the top of the head, are poisoned, and then fall into the bottom section. There is but little possibility of a child getting at poison used in this way.

MULTIPLE-TUBE AUTOMOBILE TIRE (Fig. 18)—This tire has a number of inflatable tubes, so formed that they bear on each other, with their contact edges forming right angles. Displacement of the tubes is prevented by ball-and-socket joints located at corresponding points of the abutting faces.

GUARD FOR OVERHEAD TROLLEY WIRES (Fig. 19)—The object of the trolley-wire guard is to prevent the ends from falling to the ground or to hang in such a way as to endanger the life of persons or animals, should the wire break. The guard hangers are easily pushed out of the way by the trolley pole, and then spring back again when the pole has passed.

SECTIONAL AUTOMOBILE TIRE (Fig. 20)—This sectional, nonpneumatic tire differs from one or two other sectional tires now on the market. In the first place it is round, like the pneumatic tire, and, when the sections are placed side by side on the rim, a continuous hole is formed close to the tread. This hole or air space forms an auxiliary cushion, which comes into complete use only when the walls of the main cushion are collapsed by reason of some exceptional jar or impact.

Fig. 12

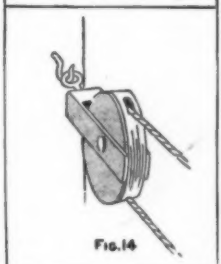


Fig. 14

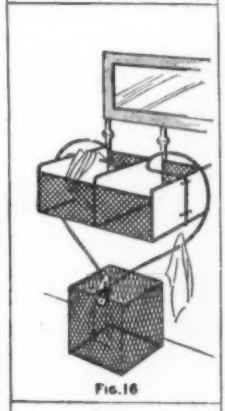


Fig. 16

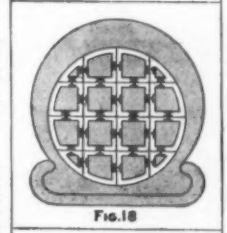


Fig. 18

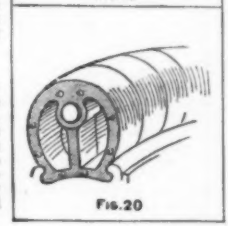


Fig. 20

SADDLEE—A man can hardly wed now unless he can show the girl two licenses.

Denston—Two licenses?

Saddlee—Yes—marriage and automobile.—Boston Post.

A Scotch class was examined in Scripture. "Can any boy or girl here tell me how Noah would be likely to use his time while on the ark?" asked the inspector. One boy timidly showed his hand and replied: "Please, sir, he wad fish." "Well, yes, he might," admitted the inspector. Another little fellow waved his hand, excitedly, and said: "Please, he couldna fish vera lang." "What makes you think so, my little man?" "Because there were only two worms in the ark."—Record-Herald.

"That doctor is a regular human dynamo."

"Yes; when I came in contact with him I myself was highly charged."—Washington Herald.

Some of the best ways of becoming wealthy have been illustrated to us, and here put down. If you will read them carefully and follow instructions explicitly, there is no doubt in our minds but that you will also be able to endow colleges and libraries.

Get a block of business property, a corner preferred. Divide it equally into four parts, and after you have carefully figured the cost on your investment, all you have to do is to find a buyer, sell three-fourths of your lot for $750,000, and keep the remainder for a warehouse in which to store good ideas.

To figure your profit on this deal tell your wife about the transaction and leave her to explain the same to her friends. About the time it comes back to you you will find that you are worth several millions of dollars.

Invent some handy and useful article to aid suffering humanity. Here are a few suffering humanity. Here are a few suggestions:

A reinforced-concrete shoe lace.

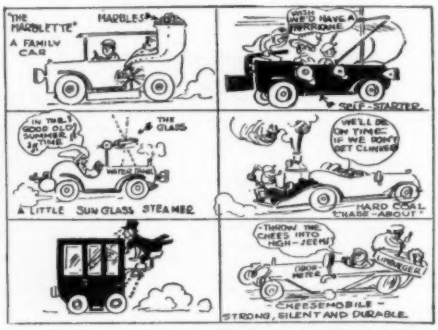
A whistling collar button.

Soap with a handle to it.

A lead pencil with an unbreakable point.

A safety razor that will cut whiskers only.—Pacific Naval Monthly.

IF THE PRICE OF GASOLINE GOES UP



Stanley in the Cleveland Press

An old gentleman was trying to cross a main street crossing, and stopped short to allow a big touring car to pass. Just before it reached him a motorcycle dashed around the car, striking the old gentleman and knocking him over. As he arose and brushed off the dust he was heard to remark: "Now, who'd have thought that automobile had a colt!"—Cleveland Motorist.

An admiring parishioner of a young divine in an Ohio town recently had a telephone installed in the clergyman's house. The good man was delighted with the convenience, and used it immediately before going to church.

When the time came for him to announce the first hymn, he read the first lines with his usual impressiveness, and concluded with:

"Let us all unite in hymn seven o three."—Lippincott's.

The Little Girl (a stranger)—My papa's an airynut. Your little boy says his is an airynut, too. Please, is he?

Bobby's Sister (gently)—No, dear; his papa is an angel.

Bobby (triumphantly)—There, didn't I tell you he was a flying-man?—Sketch.

The old mountaineer, who was standing on the corner of the main street in a certain little Kentucky town, had never seen an automobile. When a good-sized touring car came rushing up the street at about thirty miles an hour and slowed down just enough to take the corner on two wheels, his astonishment was extreme. The old fellow watched the disappearing car with bulging eyes and open mouth. Then, turning to a bystander, he remarked solemnly:

"The horses must sholly ha' been traveling some when they got loose from that gen'leman's carriage."—Youth's Companion.

A group of visitors was going through the county jail and a burly negro trusty was called to open doors for the visitors.

"How do you like it in here?" one of the women asked.

"Like it, ma'am? if evah Ah gets out o' heah Ah'll go so fer frum here it'll take nine dollars to sen.' me a postal card."—Ideal Power.

A taxicab in Athens is called a polipolytantocinetharmoxaxe. Most people would rather walk than pronounce it.

"My theory," said the eminent student, "is that the Venus of Milo was holding her drapery up with one of those lost arms."

"I see," replied the man who knows nothing whatever of art; "and signaling for a taxicab with the other."—Washington Star.

Guide—Why did you keep on a-shooting at me arter I hollered an' tole you I wasn't a deer, hey? What made you do that?

Hunter—How did I know but you was lying?—Chicago Daily News.

"His wife is a business woman all right."

"What makes you say that?"

"She's installed a time clock in the hall, and he has to punch it when he goes out nights and when he gets back."

Inventor (at quick lunch counter)—Eureka! The perfect auto tire at last. Give me the recipe for these doughnuts—they're puncture-proof.

A Chicagoan who employs a Swedish maid overheard the following conversation the other day between her cook and the maid next door, also a Swede:

"How are you, Hilda?"

"I well, I like my yob. We got cremated cellar, cemetery plumbing, elastic lights—and a hoosit."

"What's a 'hoosit,' Hilda?"

"Oh, a bell rings. You put a thing to your ear and say 'Hello,' and some one says 'Hello,' an' you say 'hoosit.'"—British American.

Three 10¢ Packages and This 25¢ Book on Beautifying the Home FREE

ASK your paint dealer for this book and two 10c packages of Johnson's Wood Dye and a 10-cent package of Johnson's Prepared Wax, free. If your dealer cannot supply you, give us his name, and we will send them free and postpaid.

The book tells how to secure the right artistic wood effects with least expense and trouble.

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is a *dye*, not a stain; it sinks deep down, bringing out the natural beauty without that artificial, grained effect. In half an hour it will be perfectly dry; no dust sticks; no streaks show. It is not only beautiful, but lasting and easy to use. Comes in 17 beautiful shades.

No. 126. Light Oak	*No. 127. Extra Dark Mahogany*	*No. 121. Moss Green*
No. 123. Dark Oak	*No. 129. Dk. Mahogany*	*No. 122. Forest Green*
No. 125. Mission Oak	*No. 130. Weathered Oak*	*No. 173. Flemish Oak*
No. 140. Early English	*No. 131. Br. Weathered*	*No. 178. Brown Flemish*
No. 110. Bog Oak	*No. 133. Gr. Weathered*	*No. 120. Fumed Oak*
No. 128. Lt. Mahogany		*No. 180. Silver Gray*

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COUPON
Value 55c
FREE!

Good at your paint or hardware store for one 25c instruction book, "The Proper Treatment for Floors, Woodwork and Furniture." Two 10-cent bottles Johnson's Wood Dye (Desired Shades.) One 10-cent can of Johnson's Prepared Wax. I asked my dealer (name)

..... but he could not supply me—so please send postpaid.

Name.....

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City..... State.....

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You, as a motorcycle rider, have exactly the same tire problems as the automobilist.

Realizing this, we have built for you a tire, made of the same Vitalized Rubber, the same fabric, the same principle of construction, built in exactly the same manner as our automobile tire.

Diamond Motorcycle Tires

with Safety or Studded Tread and Perfect 3-Point Rim Contact

and in addition the *More Mileage Strip* on the tread—an exclusive Diamond feature. All these distinctive Diamond advantages cost you no more—"More Mileage" Vitalized Rubber—Perfect 3-Point Rim Contact—the Diamond Safety Tread that "won't slip, won't slide, won't skid, it *grips*."

So this time buy Diamond Vitalized Rubber Motorcycle Tires—you can get them to fit your rims from

Diamond Dealers Everywhere

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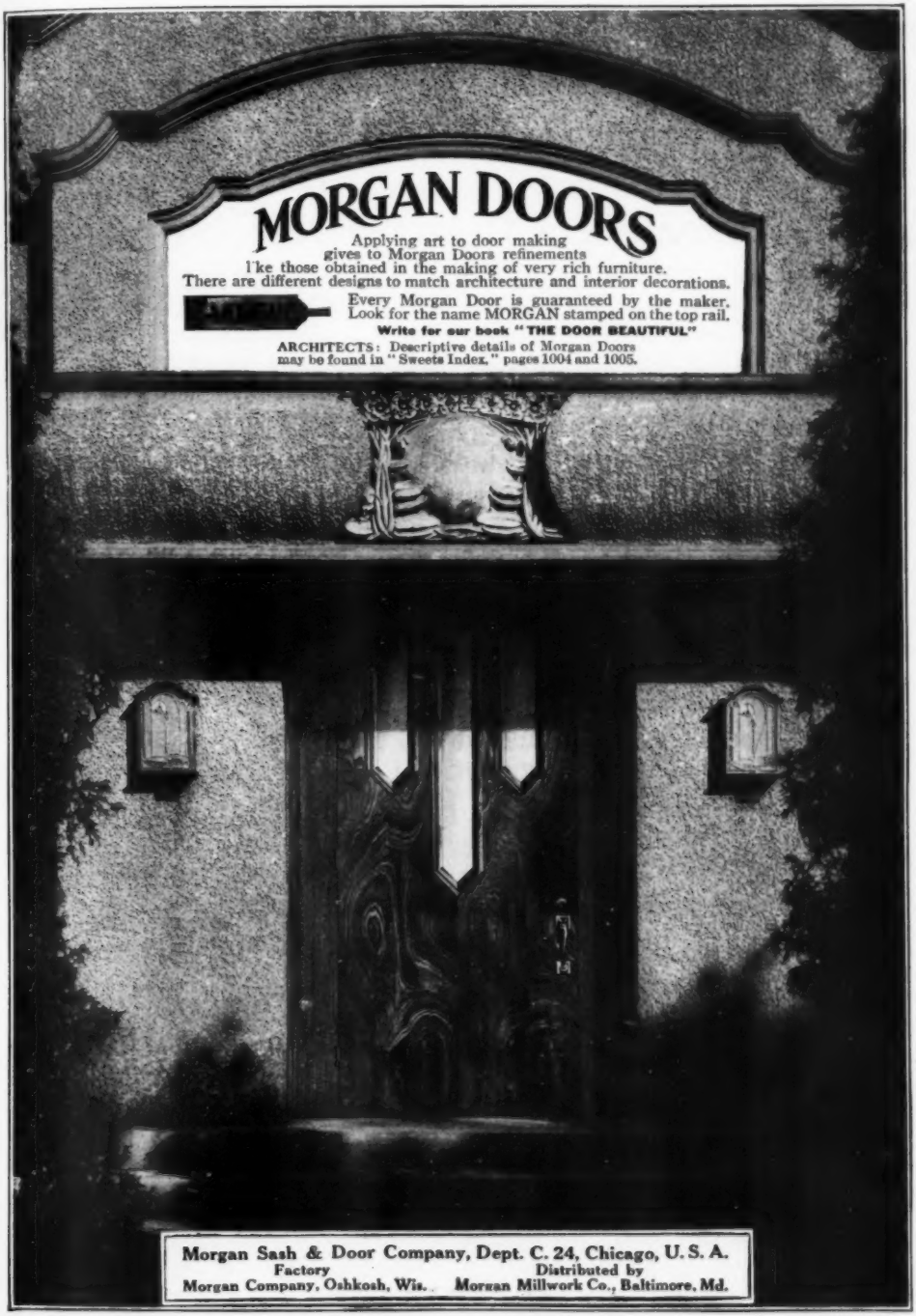
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Williams' Shaving Soaps

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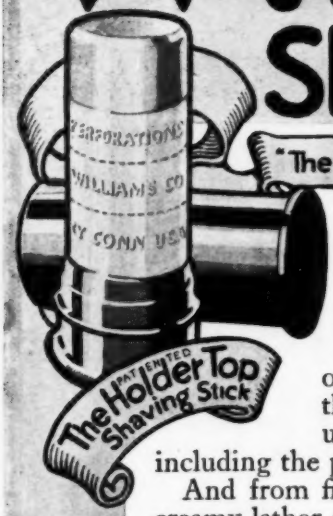

When you use Williams' Holder-Top Shaving Stick every shave is a shave of perfect comfort and economy

because the Holder Top not only offers a firm, dry holding surface for the fingers, but also permits you to use the stick down to the last bit, including the part that you used to throw away.

And from first to last you get a rich, creamy lather that softens the beard, remains moist, and leaves the skin smooth and refreshed.

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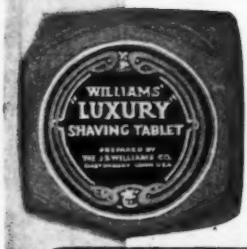

A liberal trial sample of Williams' Holder-Top Shaving Stick, Shaving Powder, Shaving Cream, Jersey Cream Toilet Soap, Violet Talc Powder and Dental Cream. Postpaid for 24 cents in stamps.

A single sample of either of the above articles sent for 4 cents in stamps.

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"Gee! I'm Glad I Have On B. V. D."

THAT's what the cool, comfortable, *coated* man is thinking, while the cross, comfortless, *coatless* ones are eying him enviously. Don't *you* be caught without B. V. D. when warm days "put you on the griddle." B. V. D. weather is *here*—B. V. D. is sold *everywhere*.

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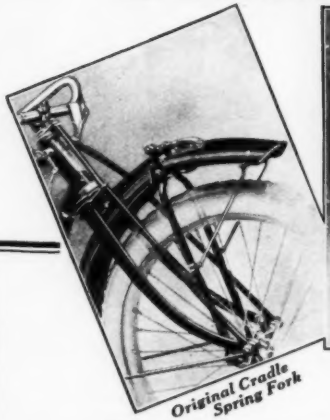
The Indian Motocycle



Original Cradle Spring Fork

Power Plant of the "Twin" Indian

Indian Cradle Spring Frame

The Four Cardinal Features of Its Wonderful Comfort and Power

Comfort for the Rider has been the chief object of our designers in the 1913 Indian. The prime motorcycle essentials of Power, Speed and Endurance, were so conclusively evident last year that they called for no improvement.

The **Cradle Spring Frame** is an entirely new departure. The rider's comfort is no longer a compromise, no longer a dream. The two sets of leaf springs between which the rear wheel is suspended, absorb road shocks without jarring the rider, either directly or on the rebound. Vibration is prevented and the life of the machine is greatly lengthened. The **Front Fork,** in use on the Indian for the past 4 years, original with us and now widely copied, was the forerunner of the Cradle Spring Frame. The **Hedstrom Motor** is known far and wide as the most powerful and reliable gas engine of its size in the world. To its prowess the Indian Motocycle owes its greatest achievements on road and track. The **Chain Transmission,** Foot Boards, in addition to pedals and separate foot-control of Brake are other important power and comfort factors.

Prices { **4 H.P. Single Cylinder, $200** / **7 H.P. Twin Cylinder, $250** } **f.o.b. Factory**

Write us for free 1913 catalog describing all models and improvements

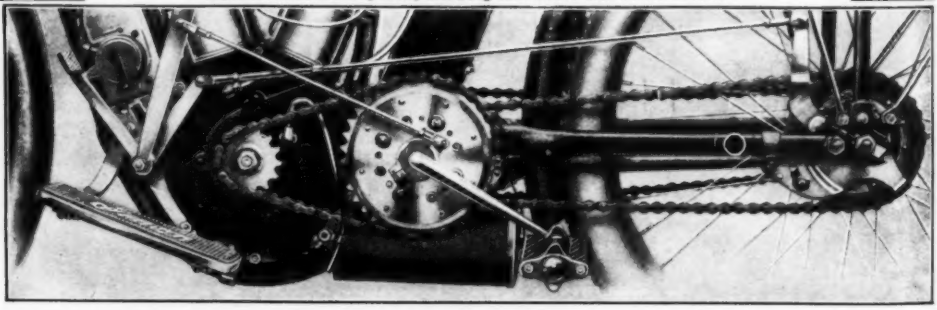
THE HENDEE MANUFACTURING COMPANY, 911 State St., Springfield, Mass.

(Largest Motorcycle Manufacturers in the World)

Branch and Service Stations:

Chicago **Denver** **San Francisco** **Atlanta** **Toronto** **London**

Double chain drive system, showing foot board and brake control



"Moving Time" a Fine Time

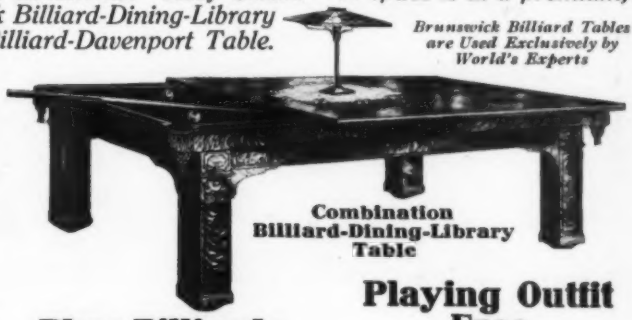
to Buy a Beautiful Brunswick Billiard-Davenport or

Billiard-Dining Table

Make "Moving Day" a *red letter* day for all the family by providing the new home with a superb Brunswick Home Billiard or Pocket-Billiard Table.

If you have a room—size 11 ft. 6 in. x 14 ft. 6 in. or larger—available *exclusively* for billiards, install the famous Brunswick "Baby Grand." *If space is at a premium, choose either the Brunswick Billiard-Dining-Library Table or the Brunswick Billiard-Davenport Table.*

Brunswick Billiard Tables are Used Exclusively by World's Experts



Combination Billiard-Dining-Library Table

"Convertible"

These handsome "Convertible" tables have won widespread popularity because of their *double economy and unexcelled playing qualities.*

They make any room in the house — Dining Room, Living Room, Library or "Den"—available for billiards.

Each style and size of Brunswick Home Billiard Tables have genuine Vermont Slate Bed; celebrated Baby Monarch Cushions; Imported Billiard Cloth. Accurate angles. Scientific construction. Equal in playing qualities to the Brunswick "Baby Grand."

From Billiard Table to Davenport Instantly

Play Billiards at Home!

Billiards is king of home games and pastimes. A Brunswick Home Billiard or Pocket-Billiard Table is a never-failing source of delightful entertainment and mental relaxation for young and old. Attracts the young folks like a "home magnet." Fun for all the family.

Over a Year to Pay!

Our low prices and easy terms bring Brunswick tables within reach of all who love the game. Write for easy terms.

Playing Outfit Free

With each of these magnificent tables you get, *without extra charge,* absolutely everything needed in the way of playing equipment. Outfit includes the celebrated "Baby Monarch" Cushions, Cloth, Cues, Rack (Ball Rack, Ball Basket, Composition Pocket Balls for Pocket Tables); Billiard Balls for Carom Table, Chalk, Tips, Glue, Bridge, Table Cover, Brush, Cue, Clamps, Markers, Set of Rules, etc. Also Book of Instructions on Billiards and How to Play. Complete information accompanies table, showing how anyone with ordinary tools can easily set it up.

Coupon Brings Free Illustrated Literature

Beautiful color-illustrated literature, showing all styles of Carom, Pocket-Billiard and Combination Tables, with detailed description of Tables and complete playing equipment for each, will be sent on request. Also our *Special Introductory Proposition and Easy Terms of Payment.* Send coupon.

COUPON

The Brunswick-Balke-Collender Company
Dept. FM, Wabash Ave. at Harrison St., Chicago

Gentlemen: Please send to the address below, Illustrated Circular of Brunswick Home Billiard and Pocket-Billiard Tables.

Name _____

Address _____

Town _____ *State* _____

The Brunswick-Balke-Collender Company

Dept. FM, Wabash Ave. at Harrison St., Chicago—9 Factories and 60 Branch Houses

The Power of Silent Service

If the crowd on the stock exchange kept quiet and let one man talk, that man could be heard in every corner of the room. But the shouting members produce a composite of sound, so that no one trader is understood except by a small group around a particular trading post.

If everyone were able to shout twice as loud, the result would be only a greater noise, and less intelligible.

For communication to be universal there must be silent transmission. In a noisy stock exchange where the voice, unaided, cannot be understood across the room, there are hundreds of telephones which carry speech half way across the continent.

The telephone converts the spoken words into silent electrical impulses.

In a single Bell telephone cable, a hundred conversations can be carried side by side without interference, and then distributed to as many different cities and towns throughout the land. Each conversation is led through a system of wire pathways to its proper destination, and whispers its message into a waiting ear.

Silent transmission and the interconnecting lines of the Bell System are indispensable for universal telephone service.

Without such service, our cities would be slow of speech and the States would be less closely knit together.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

AND ASSOCIATED COMPANIES

Every Bell Telephone is the Centre of the System

GRAFLEX CAMERAS

On a day like this

or indoors like this

THE GRAFLEX

will let you make "snap shots" fast enough to get clean cut outlines, and with exposure enough to make strong, brilliant prints.

Outdoors on bright days you can make pictures like this with exposure as short as 1-1000th of a second, if you wish. And there is no uncertainty. You don't have to guess how far you are from the subject, as there is no focusing scale on the Graflex. Neither is there a "finder." With the Graflex you see the image right side up, the size it will appear in the finished picture, *up to the instant of exposure.*

Our new Graflex Book tells all about Graflex Cameras, and how they work. May we send you a copy?

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EASTMAN KODAK CO.
12 Caledonia Avenue, ROCHESTER, N. Y.

From Childhood to Old Age

Kimball Pianos

Are Pleasing in Tone

Write Today for Beautifully Illustrated Catalogue.

Mrs. Piano Buyer Before making the purchase of a piano for your home and children we are sure you will want to see our catalogue—you will want to know about our new plan of selling and distributing our pianos direct from our factory and from our various factory distributing points. **Write us today** for our

Money Saving Plan and Free Catalogues

and learn how easily you can secure the STANDARD Kimball Piano at factory distributing prices and on terms to suit your convenience. Monthly, quarterly or annual payments can be arranged.

Valuable Features of the Kimball

Kimball Pianos possess many important exclusive features, such as our *hermetically sealed* metal covered pin block—the heart of the piano—impervious to dampness, unaffected by heat or cold, strings scientifically treated to prevent rusting, and other valuable features that give the Kimball that *heirloom value* and most splendid musical quality.

Kimball Player-Piano Perfect in Detail

There are very few persons who are not lovers of good music. Unfortunately there have been but a limited number that could produce it, but now with a Kimball Player-Piano in the home, the young, the old and even the feeble "**Indoor**" people can play and reproduce the "Grand Opera" or play any and all of the old time songs or popular pieces.

Our Great Offer

W. W. Kimball Co.
1295 Kimball Hall
Chicago

Please send me free your Piano or Player-Piano Catalogues, prices and terms, and the Musical Herald, containing two pretty songs, words and music.

Name .....

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Free Approval Test—We Stand the Freight—Convenient Payments—Catalogues and Herald Free—Old Instruments Taken in Exchange.

Fill out the coupon and send to us today and get FREE our handsome booklets and the Musical Herald, containing two pretty songs, words and music—also valuable piano information, our prices and terms. **Write Today.**

W. W. Kimball Company
Chicago

Delco

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The Iron with Three Heats

Experience with other types of electric irons in which the heat is not properly controlled has been most unpleasant and costly. The Three Heat Switch on the Delco Iron enables you to control the heat as required, High, Medium or Low. Reduces the amount of current used to a minimum and obviates all danger of scorching. This important feature makes the Delco the only perfect iron on the market. Beautifully nickeled and furnished with stand, cord and plug.

TRY IT TEN DAYS FREE

Use a Delco next ironing day. If not perfectly satisfied send it back at our expense. Write today and you will agree that "It pays to have a Delco." Sent prepaid to any part of the U.S. for $5.50. Satisfaction guaranteed or money refunded.

DIAMOND ELECTRIC CO.
75 Frederick St., BINGHAMTON, N. Y.

WORLD'S LARGEST CABLE TESTED—The largest hoisting cable in the world was recently tested at South Bethlehem, Pa. A pull of 364 tons was required to break the wire rope, which consisted of 12 strands, each of 19 wires, twisted around a hemp core. The cable was 7,810 ft. in length and weighed 125,360 lb. It is used for drawing cars with a capacity of 100,000 lb. of ore up an inclined plane 5,800 ft. long.

ELECTRIC LIGHT PLANTS Complete gasoline engine, dynamo, switchboard and storage battery $240. Agents wanted. **American Battery Co., 1129 Fulton St., Chicago (Estab. 1889.)**

Try to wrench the head off—

MR. MACHINIST—You know the danger of twisting the head off a set screw. Try this on a

MAC-IT SET SCREW

Set the steel block firmly in a vise, take a wrench and try your hardest to twist the head off. Your name, address business and dealer's name brings test set free.

STRONG, CARLISLE & HAMMOND CO.
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Test Set FREE Pin ad to letterhead, give dealer's name and mail today.

25 Years Ago, My Son,

I began using

Star Hack Saw Blades

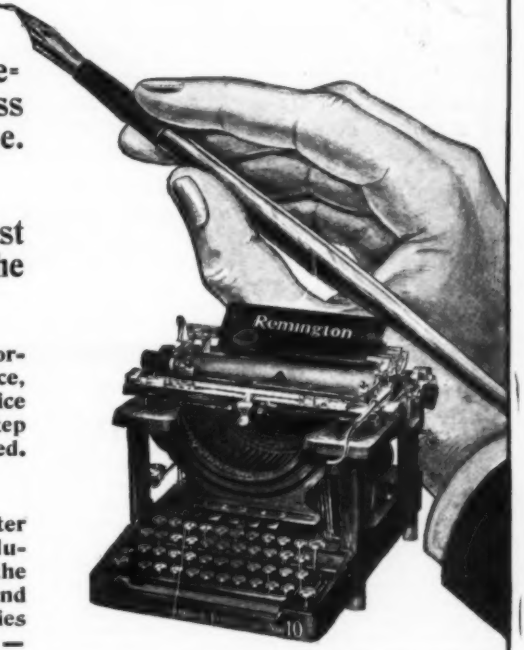
Whenever a new blade came on the market, I gave it a fair trial, but always came back to a "Star" because I could never find a blade that equalled it in uniformity. That's been my experience—and it's why I always recommend Star Blades. You will find the "Star," 14 teeth per inch, the most reliable all around hack saw blade you can lay your hands on. For 1-16" tubing or less, use Star Blade, 24 teeth to the inch.

Star Hack Saw Frame No. 10

is quickly adjusted, and will hold blades 6, 7, 8, 9, 10, 11 and 12" long.

MILLERS FALLS COMPANY
28 Warren St. NEW YORK
Write for catalog

Necessity was the Mother of the Remington



WHEN the *need* of the typewriter came to the business world, the Remington came. Others *followed.*

Remington was the first typewriter — it is still the *first* typewriter.

First in the field, the Remington organization began building experience, step by step, from the actual practice of typewriter users — always a step or two in advance of the users' need. Other makes *followed.*

Today the Remington typewriter stands unique as the greatest revolutionizer, the greatest energizer the commercial world has ever seen. And by no means *least* of its beneficiaries are *all* other makes of typewriters — for the Remington *created* the typewriter industry and blazed the way — for the others to *follow.*

1,600,000 Remington - written letters mailed in New York City alone every business day in the year.

That tells the story of Remington pre-eminence, of the confidence of captains of commerce in it, of the faith of tens of thousands of efficient employees, of the limitless selection in choice of operators and choice of positions — the machine that has made work for the millions, and millions for the work.

Remington — the first Typewriter

Remington Typewriter Company

(Incorporated)

New York and Everywhere

This 5-Room Summer Cottage $298

SHIPPED ANYWHERE

BUILD IT YOURSELF—IN A FEW DAYS

DON'T you know a place where you would like to put this cottage, on the shore or in the woods. We will ship it to your station — complete to the last detail, all material being Readi-Cut, so you can build it yourself. It isn't the portable, flimsy kind, but built just like a dwelling house. When it's up, it's up to stay. You get all the lumber, windows, doors, shingles, hardware, paint, nails, glass, everything needed, and full instructions. We have a complete line of summer homes from $125 up to $1500 in price — Garages, sleeping porches and sun rooms.

Summer Cottage Catalog No. 99
Dwellings and Bungalow Catalog P
Which shall we send you, or both

ALADDIN READI-CUT HOUSES SAVE MONEY

North American Construction Co.
383 Aladdin Ave. BAY CITY, MICH.
Mills in Michigan, Florida, Texas, Missouri and Oregon

Quick Shipment

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Is a fascinating as well as a profitable pastime, where one makes it a study

If you are interested, write for a free sample copy of the leading publication issued on the subject, edited by C. H. Mekeel, the leading expert in this line in America. If you have a collection of stamps, we will send you selections of foreign stamps **on approval** upon request.

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The AutoStrop Safety Razor
Guarantees 500 Shaves
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Anybody can add $8 to $40 per week to their income, in spare time, entire year growing mushrooms in cellars, sheds, barns, boxes, etc. I tell you where to sell, at highest prices.

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Let Your Engine or Motor Do the Work

A Blessing For Women

and make an end to washday drudgery in YOUR home. Of course, NONE of the unsanitary, old-fashioned wooden rotary washers will do. ONLY THE MOST UP-TO-DATE machine ought to be good enough for YOUR wife. EXPERTS will tell you that NO MORE DURABLE and PRACTICAL washer can be found than the famous

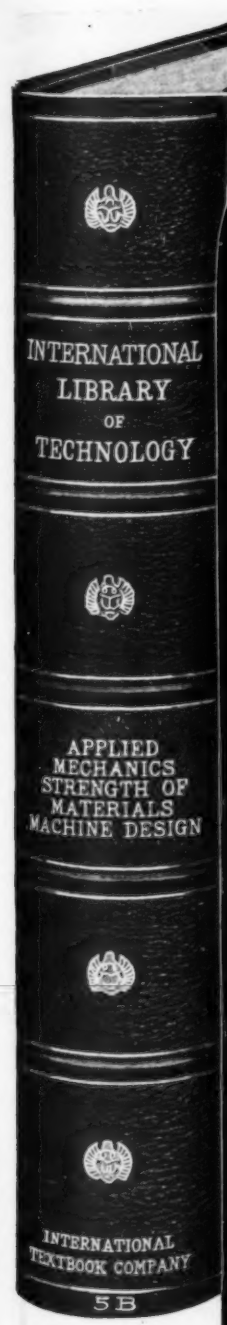
All Metal Sanitary Paragon Revolving Cylinder Power Laundry Machine

Indestructible. NO WOOD used in any part. The PARAGON is a true reproduction of the expensive and powerful Cylinder Washers exclusively and successfully used in Steam Laundries, Hotels and Hospitals. Over 100,000 Paragon Washers used in the U. S.

A Golden Opportunity for 30 Days Only

to secure one of these wonderful genuine laundry machines, complete with REVERSIBLE POWER WRINGER at a very considerable REDUCTION in price, if you write AT ONCE for Catalog No. 1 and further details of the most generous proposition made.

PARAGON MFG. CO., 2401-03 W. 14th St., CHICAGO



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Just a "Twist of the Wrist" Starts or Stops the Machine!

The 1900 Motor Washers are now at work in thousands of homes. They are doing the work formerly done by women, **at a cost of 2c a week for power!** Saving thousands upon thousands of dollars in wash bills. Saving worlds of wash-day troubles. Leaving the women free to do other work while the machines are doing the washing.

Doing the wringing with **1900 Electric Motor Washer**

The 1900 Motor Washer

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1900 WASHER CO., 6061 Court St., BINGHAMTON, N. Y.

OR, IF YOU LIVE IN CANADA, WRITE TO THE CANADIAN WASHER CO., 355 YONGE ST., TORONTO, CANADA. (23)

HESS Sent on Approval FURNACE

No. 45 "Lady" Hess Steel Furnace
Price $49
Delivered East of Omaha and North of Ohio River
Pipes and Registers Extra

We will deliver a complete heating equipment at your station at factory prices and wait for our pay while you test it during 60 days of winter weather.

The entire outfit **must satisfy you** or you pay nothing. Isn't this worth looking into? Could we offer such liberal terms if we didn't know that the **Hess Furnace** excels in service, simplicity, efficiency, economy?

We are makers—not dealers—and will save you all middlemens' profits. No room for more details here. Write today for **free** 48-page booklet which tells all about it.

Your name and address on a post card is sufficient.

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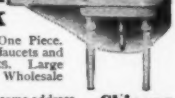
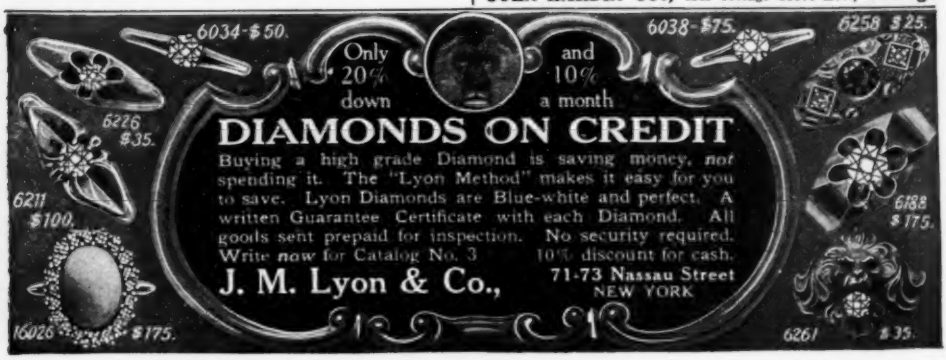
$18.85 for this $28 Porcelain Enameled Roll Rimmed Sink



Long back and enameled drain board, All in One Piece. 20 in. wide, and 52 in. long. Price includes faucets and legs. WRITE FOR CIRCULARS AND PRICES. Large stock **Plumbing** and **Heating Supplies** at Wholesale to Consumer at Lowest Prices.

JOHN HARDIN CO., 25 years at same address 4545 Cottage Grove Ave., **Chicago**



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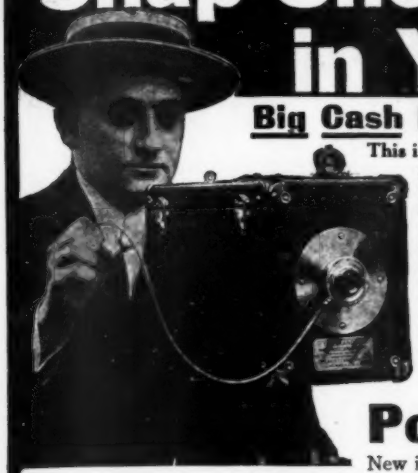
"Snap Shot" Money in Your Pocket



Big Cash Profits for You $5 to $20 a day in your own big-paying business. **This is your opportunity** to get out of the "time clock" line and the "pay envelope" brigade. **Without one bit of experience,** you can join our force and become **a one minute photographer.** This is the newest and most profitable branch of the photographic profession. You can work all or spare time—travel or at home. This new, wonderful business will earn enormous profits for you. Everybody buys our new one minute photo post cards. Big money making photos at private houses, picnics, on the streets, in the small towns, in large cities, at fairs, carnivals, conventions, street parades, aviation meets, etc. Profits begin first day and **you make 500 per cent on every sale.** Don't delay—don't wait. Write us today for free information, and begin making money at once with

The "Mandel" Post Card Machine

New invention—wonderful machine that takes, finishes and delivers five different styles of photos. Turns out original post card photos (also button pictures) at the rate of three a minute **RIGHT ON THE SPOT WHERE YOU TAKE THEM.** Wonderful, new, photographic process—startling—sensational—

Photos Direct on Post Cards

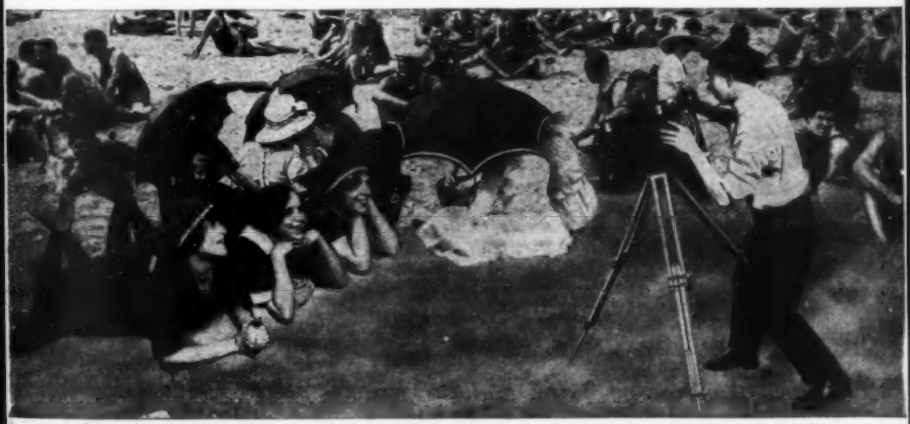
Without Plates, Films, Printing or Dark Room

Machine is everything in one—a **complete, portable post card gallery.** Excites interest, arrests attention, compels immediate orders from every onlooker. **SMALL CAPITAL STARTS YOU.** Sale of supplies that come to you with outfit practically gives you back entire investment—and you have the business clear and fully established. You begin making money the same day the outfit arrives. Immediate sales—immediate profits. If you are sincere and really want to make $2,000 this year—**DO NOT DELAY**—show us that you are in earnest—that you mean business. We will show you how to get the money. **Write now—at once.** Information is **FREE.**

$600 Profit in 3 Months

That is what A. L. Wood, of Great Falls, Montana, made with a "Mandel" Post Card Machine. **We can prove this.** Read these late reports: Cable, of Wyo., writes: "Made **$27.00** in 2 hours." Bryant, of Colo., made **$16.00** in 6 hours. Evans, of Miss., says: "Made **$15.75** last Tuesday." Perry, of Ky., "Made **$50.00** in 2 days." Hundreds of actual, bona fide letters like these on file.

WRITE US TO-DAY



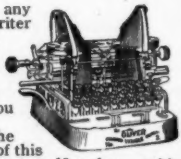
Here's one of our lucky "Mandel" operators, busy at the beach, turning out one minute photos of the jolly bathers. This is one of the many ways to make big money as a "Mandel" photographer. ADDRESS EITHER OFFICE

The Chicago Ferrotype Company

608 Ferrotype Bldg., Congress & Laflin Sts., Chicago, Ill. OR Dept. 608, 89-91 Delancey St., New York, N. Y.

$4 a Month For This Genuine Oliver No. 3 Typewriter $56

No Money Down—Free Trial



You are not asked to pay any money until this famous typewriter has been delivered to you and you have used it and found it to be satisfactory and wish to keep it.

Then the terms are $4.00 down and $4.00 a month until you have paid $56.00.

Four dollars a month is the exact amount that machines of this quality bring for rental—it amounts to 13c a day—at this rate you can make the typewriter pay for itself.

No cash till you accept it—no interest on payments—no extras of any kind—each machine delivered on this proposition is a genuine perfect No. 3 Oliver typewriter, shipped in the original box as packed at the factory. Each has the full standard equipment and each is guaranteed against defect of material or workmanship for the life of the machine.

Sold without salesmen or agents. *You get the saving*—No salesmen are necessary to sell a genuine No. 3 Oliver at this price.

12,000 orders have already been filled.

Be sure and send today for our celebrated book, "Your Final Typewriter," which fully describes this famous machine and tells you some very interesting things about the making of typewriters.

Just write your name on a postal card or on the margin of this page and tear it out and mail it now.

Typewriters Distributing Syndicate
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for **designers, architects, engineers** and **students**—compact, durable and convenient. Spaulding's Carrying Cases are made light and strong. They provide well arranged compartments, **including space for drawing board and T square.** Handled like a suit case; unique, practical, inexpensive. Outfits include all necessary equipment. If you draw, send us five 2-cent stamps to-day to pay postage and get the free triangle and the catalogue.

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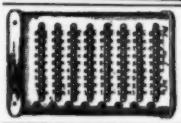

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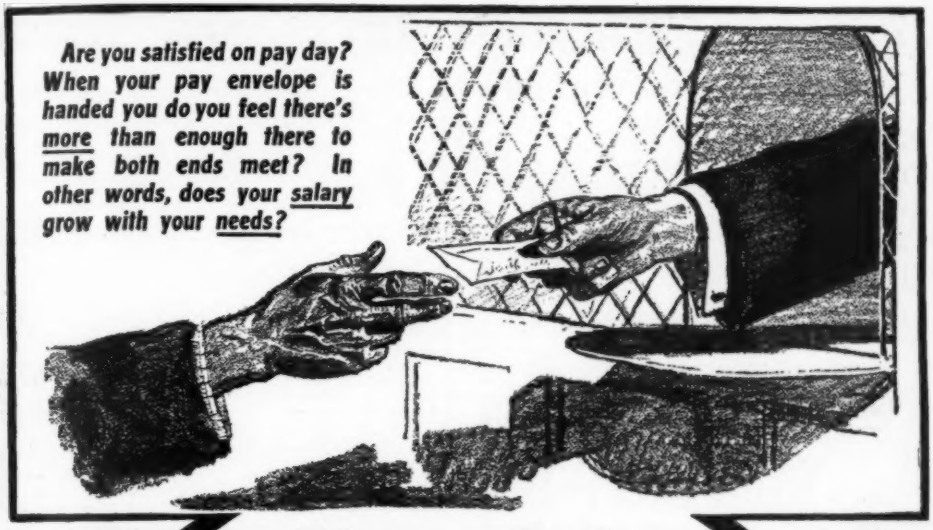

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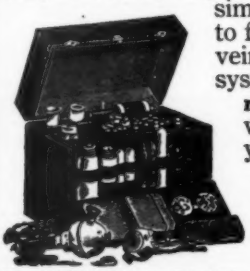

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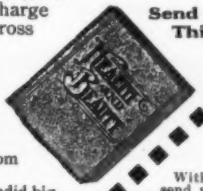

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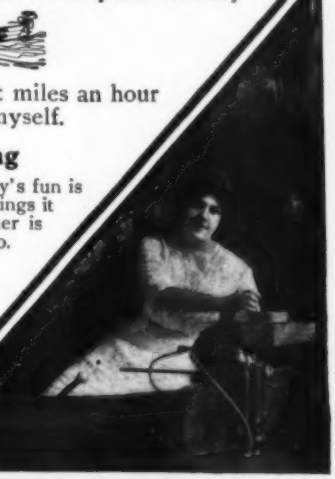

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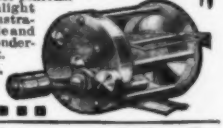

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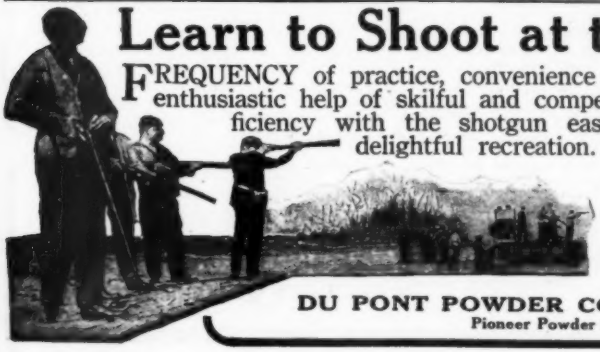

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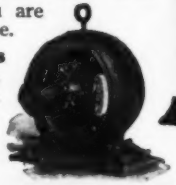

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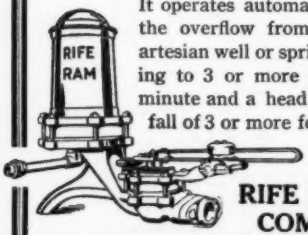

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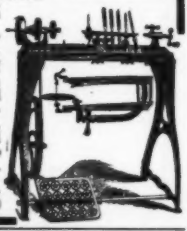

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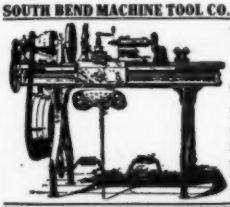

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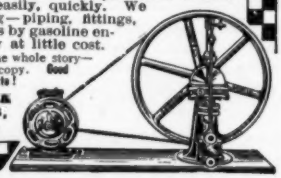

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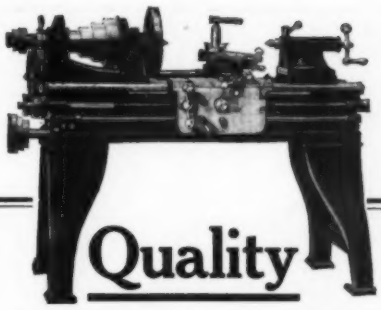

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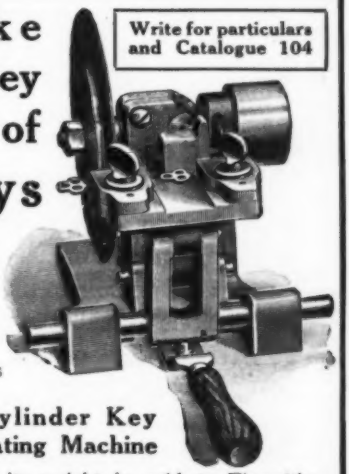

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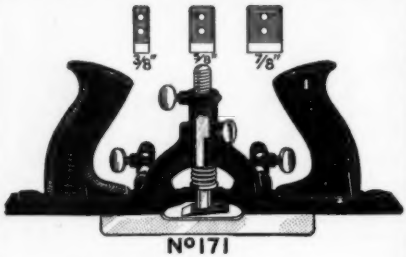

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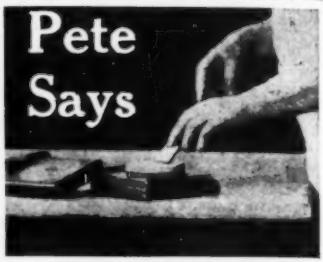

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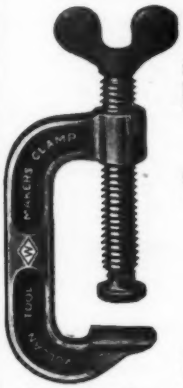

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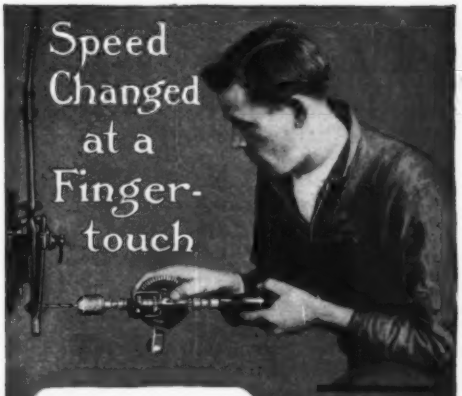

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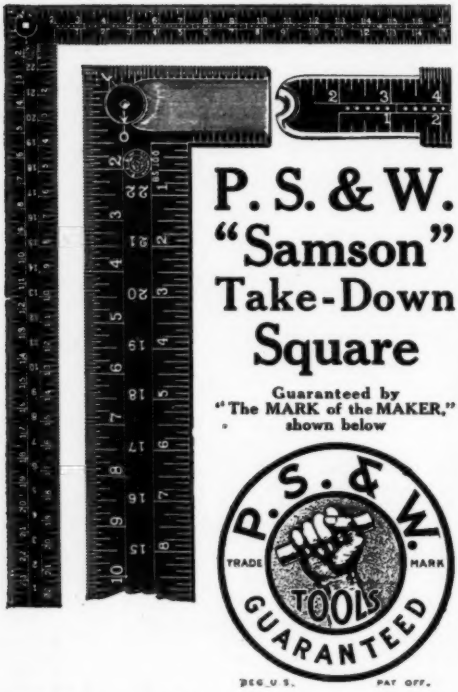

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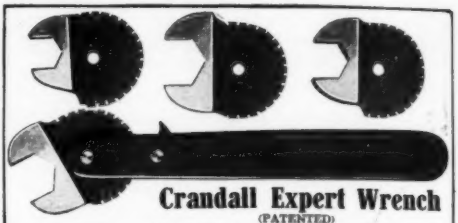

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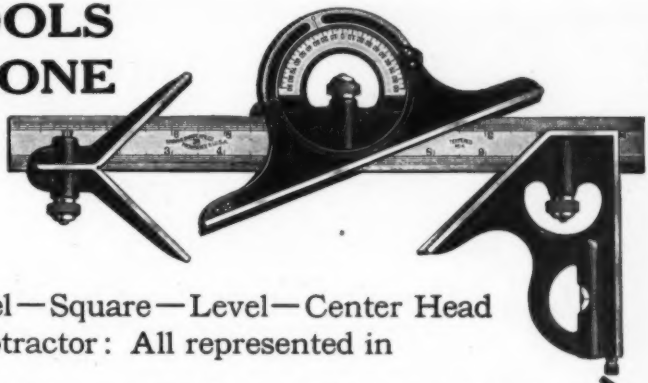

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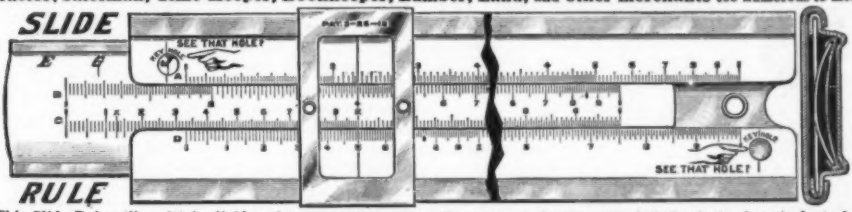

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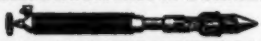

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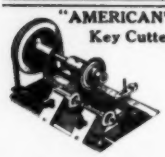

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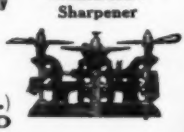

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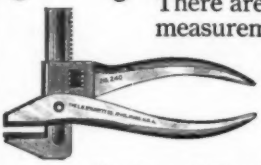

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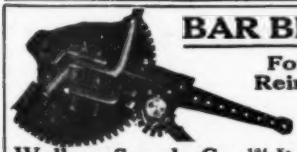

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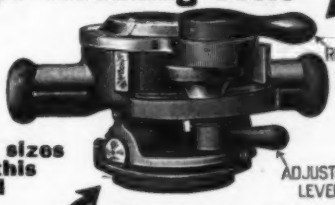

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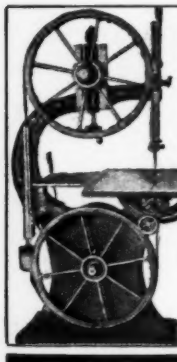

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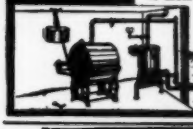

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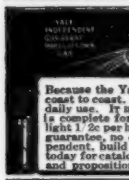

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The cheapest, best and most beautiful light obtainable for town or country. Makes and burns its own gas; 300 C. P. 5 hours for 1 cent. Can be used anywhere with amazing results. Low in price. Thoroughly reliable. Many new and exclusive features. Best proposition of the year for agents.

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We want 35 or 40 men right away who can use the following tools: auger, screw-driver, hammer and wrench. We want you to install or put in our Hydro-Carbon Lighting System, and fill orders. We furnish full instructions and complete charts so you can do the work with the common tools named above.

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Our lighting system is for farm, village or town homes where for a slight cost we fully equip a house with a perfect, safe, simple, lighting system. The combination of hydro-carbon flame and gas mantles produces a bright, steady light, remarkable for its brilliancy compared with regular gas or kerosene lamps. Lights as easily as ordinary gas. No lamps to fill. No grease, grime or dirt. No expensive piping to do, simply a hollow copper conduit wire no larger than a slate pencil. No tearing of floors, breaking plaster, no muss or litter. The wire is easily and quickly passed through partitions attached to mouldings, walls or ceilings.

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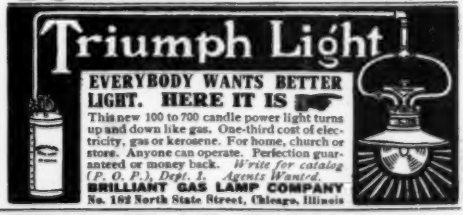

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to save the time, labor and expense of ironing the old hand way. It produces a most beautiful finish, superior to that of an expert hand laundress, besides insuring longer life to your Linens, Towels, Curtains, Underwear, Flat Pieces, in fact, 80 per cent of your entire ironing.

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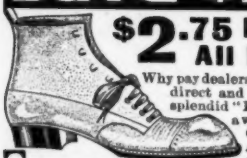

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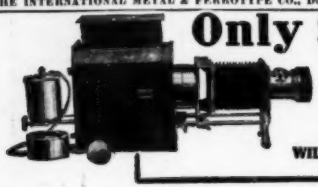

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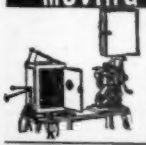

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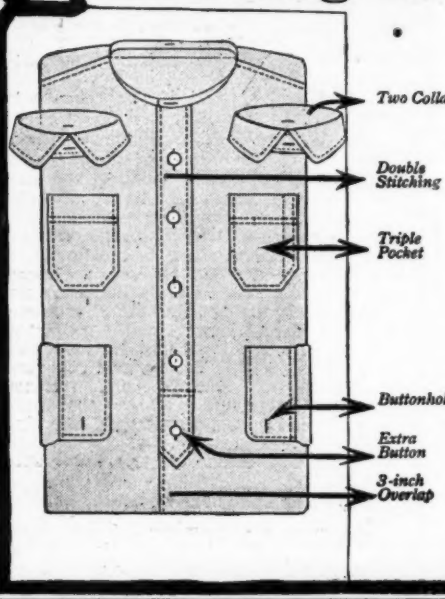

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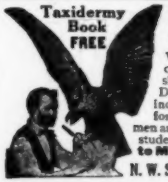

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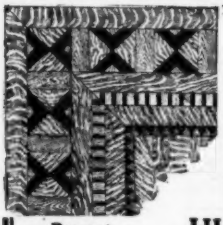

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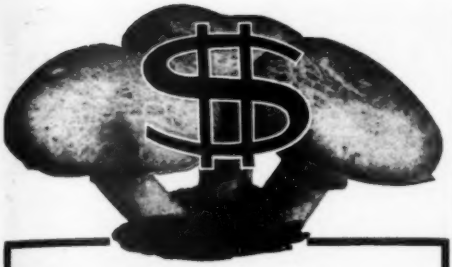

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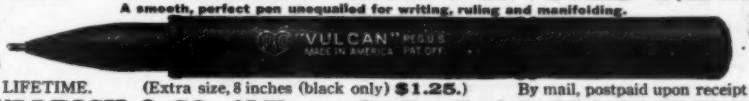

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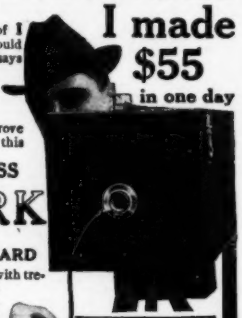

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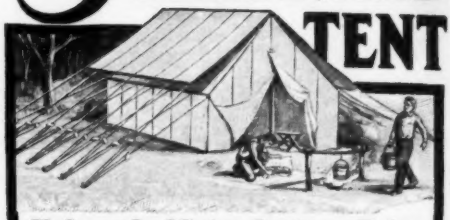

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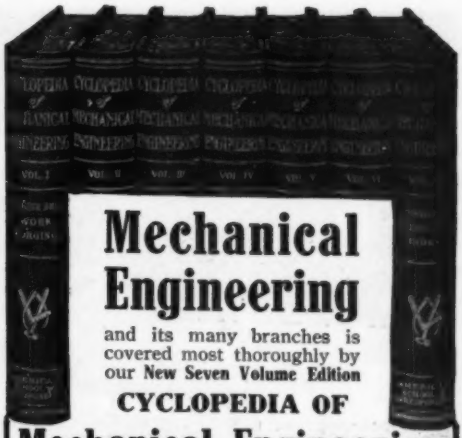

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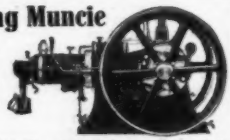

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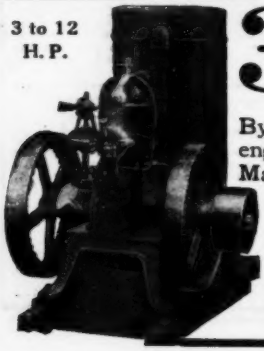

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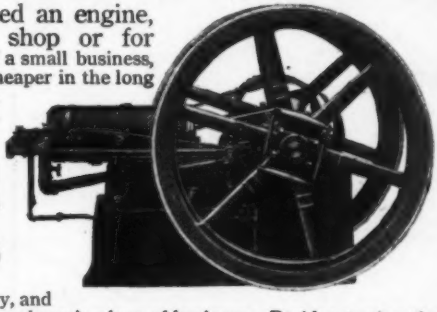

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are thoroughly tested before they leave the factory, and are again tested when they are installed in the purchaser's place of business. Besides testing the engine thoroughly, we guarantee its satisfactory performance and that guarantee is worth having.

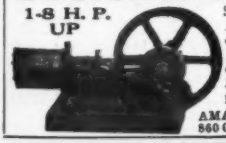
Among satisfied users of I H C engines are model makers, carpenters, tin and metal workers, bakers, launderers, printers, and men in practically every line of business where a steady dependable power is required. You cannot buy a better engine. Sizes: 1 to 50-horse power, tractors: 12 to 60-horse power. Styles: one to suit your needs. Fuels: gas, gasoline, kerosene, naphtha, or alcohol. *Write for catalogue, which gives complete information of the whole line.*

INTERNATIONAL HARVESTER COMPANY OF AMERICA
(INCORPORATED)
16 Harvester Building CHICAGO

Sea grow the more aristocratic variety. In Europe and the United States Circassian walnut is called English walnut, but has no great value. The demand for the Circassian walnut, which always exceeds the supply, has led to substitution. Our American red gum and butternut, as well as some of the African and South American woods which resemble Circassian walnut are often sold as such. But none of them possesses the delicate tones, fine bird's-eye figures, burls and velvety texture of the real wood. The government has just isued literature which tells the distinctive marks of the genuine article.

SMALL ENGINES

1-8 H. P. UP



Steam, Gas and Gasoline. For Amateurs and Mechanics. Circulars for Stamp. Big Catalogue Engines, Small Power Machinery and Electric Light Plants, 2 Lights up. Sent for 10c (coin preferred). Refunded first order.

AMATEUR MECHANICS SUPPLY CO.
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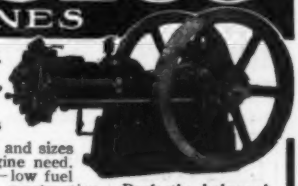
"INGECO" ENGINES

1½ to 350 H. P.
Gas, Gasoline, Oil and Producer Gas



Includes all types and sizes to meet every engine need. Simple to operate—low fuel cost—substantial construction. Perfectly balanced, smooth, steady, reliable. Sales branches and stocks everywhere. If you expect to buy an engine our expert will tell you what is best and cheapest for you.

INTERNATIONAL GAS ENGINE CO.,
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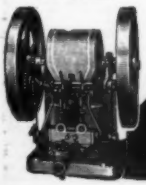
This Extraordinary Engine

Single and Double Cylinders—Burns Gasoline, Kerosene, Gas or Distillate—Simplest, Most Powerful, Reliable and Economical Engine Made. All Sizes, 1½ to 50 H. P. We Will Trust You.



Saves 1/2 Fuel 2/3 Weight Gives Most Power

The Only Engine that Has Solved the Problem of Violent Vibration

This is the famous TEMPLE which stands on its feet—the up-to-date *Economical Engine* that has won every prize contest against well known makes. *Practically no vibration!* Explosions take place low down close to the ground which absorbs and does away with the shock and strain on the engine. In every other engine explosions occur high up, causing violent vibrations that reduce life of engine. Crank Shaft over Cylinder secures perfect lubrication by gravity. No other engine has this! "TEMPLE," alone, has downward lubrication—hence *less friction and greater power from every pint of fuel!*

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YOU CAN TEST IT 30 DAYS FREE

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Railway Mail Clerks
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Develop more than rated power on either Kerosene or Gasoline. Adapted to all power work on the farm. Our immense factory facilities enable us to sell these

High Grade Engines At Remarkably Low Prices

Jack of All Trades are strongly built of best materials. Large bearings. Ample Lubrication. All parts accessible—you can get at every nut with a simple S wrench. 2, 4 and 6 h. p. Horizontal. Also 2, 4 and 6 h. p. Vertical. Other types up to 500 h. p.

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2¼ HORSE POWER

HERE is the most reliable 2¼ H. P. Engine in America. It gives such perfect satisfaction that we ship it anywhere in the world on terms of only one-half the purchase price or with your order and six months' time on the balance. If you want an engine any size, 1½ to 12 H. P., write me today for Big 4-color Engine Catalog and Price List, lowest you ever heard of. Save you $20.00 to $100.00 sure. Do it now—today.

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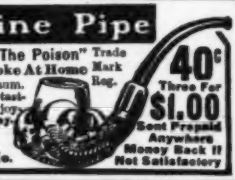

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Largest Limb Factory in World.

$50 to $300 SAVED

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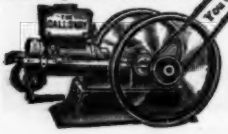
You Can Make From $5 to $10 a Day

Direct From My Factory Satisfaction or Money Back

Write for special proposition to 10 or more men. Send for my big **BOOK FREE.**



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with our brain tickling puzzles. Sample for 10 cents or three good ones for 25 cents. Catalog included.

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ANY STYLE — DIAMONDS

at 1/40 the cost—IN SOLID GOLD RINGS

Stand acid test and expert examination. We guarantee them. See them first—then pay. Special Offer — 14k Tiffany ring 1 ct. $5.98. Gents ring 1 ct. $8.98. 14k Stud 1 ct. $4.88. Sent C.O.D. for inspection. Catalog FREE, shows full line. Patent ring gauge included, 10c. The Baroda Co., Dept. 93, Leland & Dover Sts., Chicago

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Needs No Batteries, Magnetos, Coils or Timers

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4 H.P. $85 complete

For R'y Hand-Cars. Factory trucks, timber carts, Mining cars, etc. Sliding base belt tightener starts slowly, not with sudden jerk. Reversible, runs either way. Splendid also for electric light outfits, moving picture machines, spray pumps, etc. Get prices and catalog of this line also.

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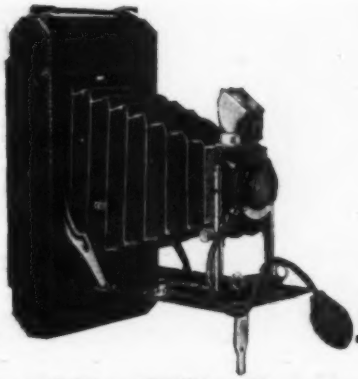

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In order to try our Camera you will need a roll or two of films, so we make you this special offer: Send us 50 cents when you send the coupon and we will send you with the Camera a roll of films that will take six pictures. After you have taken the pictures, mail us the roll of films and we will then **develop** and **print** them for you and return them **ABSOLUTELY FREE OF CHARGE.** This free trial offer is good for a short time only, therefore, do not wait, but **fill out and mail coupon below at once.**

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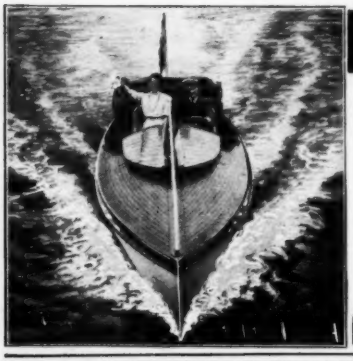

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Built like Government Torpedo Boats of tough, puncture-proof, galvanized steel plates, pressed to rigid form and so securely joined together that a leak is impossible. The Mullins Steel Boats are GUARANTEED against puncture, leaking, waterlogging, warping, drying-out, opening seams, and NEVER REQUIRE CALKING. Air-tight compartments like a lifeboat.

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Build Your Own Boat

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from our patterns or knock down frames. You save ¾ the cost and enjoy the work.

Patterns and frames for boats of all types and sizes, from the canoe pattern at $1.75 to the 65 ft. yacht frame at $350

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which tells you all about it. You can build a 20 ft. launch for $30 from patterns, that you could not buy at any factory for less than $150, or you can buy the complete frame and build this 50 ft. cruiser shown in the picture for less money than you would have to pay for the cheapest 25 ft. finished cruiser you could buy.

The Boat You Build

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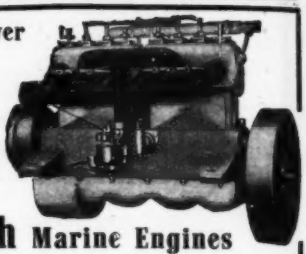
12 Horse Power
4 Cylinder
4 Cycle
Weight 370 lbs.
Speed
600 to 1000 R. P. M.

Made in one size only. A specialized article.



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the world's standard in 12 H. P. size, are made of the finest materials the market affords and workmanship of pronounced excellence. **Prices $150 to $200**

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Jeffery's SPECIAL MARINE CANOE GLUE

BEST FILLER FOR CANVAS

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Send for circulars. At all Sporting Goods Houses

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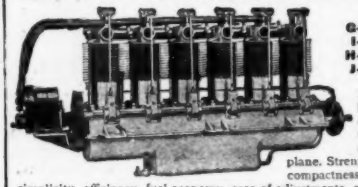
WOOL PRODUCTION IN THE UNITED STATES—In the United States there are 38,481,000 sheep of shearing age which produced last year 304,043,400 lb. of wool, worth $76,020,229 to the growers, or an average of a little over 25 cents a pound. Montana continues to lead the other states in size of flocks with 4,300,000 sheep. Wyoming is second with 3,900,000 sheep. The heaviest fleeces were those of Washington, which weighed 9 lb. each on the average. It is interesting to

KEMP AIR COOLED AEROPLANE MOTORS



MODELS
G-2 16 H. P.
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H-6 55 H. P.
J-8 75 H. P.

Designed and built to the requirements of the Aeroplane and Hydroplane. Strength, reliability, compactness, lightness, simplicity, efficiency, fuel economy, ease of adjustments, ease of starting, and minimum head resistance, the ten most important points, and our motors contain these features. Built by skilled mechanics and only the best of material and equipment used. It will be better and cheaper to equip your plane with a reliable and efficient power plant in the start.

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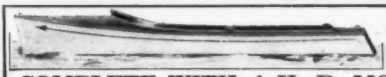

$85

COMPLETE WITH 4 H. P. MOTOR

$85 buys this 18 ft. Dunphy Semi Speed Model—for the complete finished K. D. frame, together with a H. P. motor and marine equipment. We carry in stock for immediate shipment a complete line of finished launches, rowboats and canoes. Also K. D. frames for any kind of boat. **Get our catalog.**

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Motor Boating Without Danger

The man with a **Baldridge Reverse Gear** in his boat can laugh at the dangers that threaten the man who controls his boat in a "hit or miss" way. The "Baldridge booster" controls **his** boat like an automobile—stops, reverses, goes ahead, simply by moving a lever—engine doesn't stop. Superior features of "Baldridge" construction make it almost wear-proof. Fully enclosed.

If not at your dealer's, send now for free book on safe motor boating.

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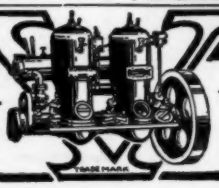
VIM MOTORS



5 to 55 h. p. THREE KINDS—SPEED—REGULAR—HEAVY DUTY

Strong, neat, simple—absolutely dependable. Win your enthusiastic confidence. Accessible. Built to last a life time. Heavy brass fittings. Non-back-firing. Double ignition. Easy starting fly wheel.

VIM MOTOR COMPANY

1, 2, 3 and 4 CYLINDER
USE GASOLINE OR KEROSENE

Your boat will provide exhilarating and healthful recreation—equipped with a VIM. It's the old boatman's choice. Thousands now in use, 8 or 9 years old. Read 27 reasons why in "Boating Facts"—our new free book.

105 Water Street, Sandusky, Ohio

note the great amount of shrinkage in the fleece due to scouring. Wyoming's fleeces shrunk 67 per cent. The total flock in the United States decreased by 1,280,000. The greater part of this decrease was in the western states, due to the severe winter last year.

BAY STATE MOTORS

"Perfect Simplicity" and "Simple Perfection" are the results, embodied in these Motors, of 15 years devoted to the developing of these essential characteristics, which enable us to put on the market a reliable and economical motor at a reasonable price. Write for catalog, stating size and type (2 or 4 cycle) of motor wanted. We also furnish castings for these motors.

BAY STATE MOTOR WORKS
Successor to
A. J. HOULE MOTOR WORKS
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WATKINS' SPECIAL MOTORS

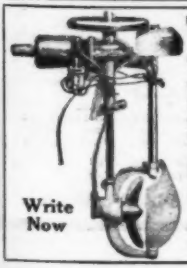
3 H. P. Single Cylinder . . 35 lbs.
6 H. P. Double Cylinder . . 60 lbs.
12 H. P. Four Cylinder . . . 140 lbs.

A strictly HIGH GRADE Motor that will give CONSTANT and EFFICIENT service. Especially adapted for CANOES and LIGHT BOATS. Aluminum base, copper water jacket, steel shaft, bronze bearings.

THE WATKINS MOTOR CO.
837-839 West Sixth Street CINCINNATI, OHIO

BUILD YOUR OWN STEEL BOAT

From patterns and printed instructions. Save ½ Cost. Work easy. Material furnished. Also finished boats. Send for catalogue and prices.
F. H. DARROW STEEL BOAT CO., 517 Perry St., ALBION, MICH.



The Powerful "Porto"—55 lbs.—2 H.P.

The most power for the **price**—the most power for the **weight**—that's what you get in the ORIGINAL portable marine engine. Note this—2¼ bore, 3 in. stroke—**that's** what counts. That's why the PORTO drives an 18 ft. row-boat **7 miles an hour**, for **4 hours on a gallon** of gasoline.

On or Off in 5 Minutes—Sold on Trial

The new model is copper jacketed, has under water exhaust, steers with tiller ropes. Get our catalog for complete details of this and other Waterman Motors for every purpose.

Write Now

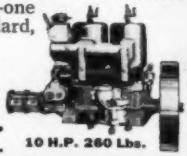
WATERMAN MARINE MOTOR CO., 230 Mt. Elliott Ave., DETROIT, MICH.

Roberts Motors in Both Outfits

ROBERTS MOTORS
FOR BOATS AND FLYING BOATS

This shows Hugh Robinson in a Roberts Equipped Flying Boat saluting the pilot of a Roberts all water craft. Roberts Motors are built in twenty-one models, 3 to 125 H.P., 1 to 6 cylinders. Standard, Aerolite, and Featherweight Types.

Operation on KEROSENE or GASOLINE
Marine or Aero Catalog FREE



10 H.P. 260 Lbs.

THE ROBERTS MOTOR CO.
1419 Columbus Ave., Sandusky, Ohio, U.S.A.

Light as a Feather Straight as an Arrow

Unless your canoe is that kind you don't know what a real joy a thoroughbred canoe is. There are hundreds of ill-balanced canoes that are as cranky as a balky horse. The genuine

"Old Town Canoe"

built by the master workmen of this trade, sets the pace for canoe designers and builders the world over. The "Old Town" is the choice of experienced hunters, campers, and voyageurs. You will appreciate the great difference between the genuine "Old Town" and its emulators, whether you summer in the wilds or keep your own canoe in the park lake.

Write for our catalog of canoe facts. Agents everywhere. 3000 canoes in stock assure prompt delivery.

OLD TOWN CANOE CO., 1265 Middle St., Old Town, Maine, U.S.A.

MULLINS CEDAR CANOES CAN'T SINK

The famous Yale and Harvard models—highest grade material—finest finished—the strongest, staunchest, handsomest canoes built. When equipped with Mullins Patented Buoyancy Pads these canoes have sufficient buoyancy to float when capsized or filled with water and keep two people afloat. Open gunwale construction—Keel—Heavy Pressed Bronze Bang Plates protecting stems.

Handsome Colored Catalog Free

THE W. H. MULLINS CO.
362 Franklin Street Salem, Ohio

THE TRIMMING OF ELECTRIC LAMPS IN BOURNEMOUTH, ENG.—The old method of trimming the arc lamps on the exceptionally tall poles which are a distinguishing feature of Bournemouth, Eng., was to push a large cage on a truck to the foot of each post, to attach the cage to a lifting cable, and to hoist this, with a man inside, to the top. Now, this has all been supplanted by the safe and cheaper method of lowering the lamps to the ground for trimming and cleaning.

Send Stamp for Catalog—
Ask about the

"FAULTLESS KID"
Family Launches, Runabouts, Cruisers, Hydroplanes

VALLEY BOAT & ENGINE CO.
1205 Hess St., Saginaw, Mich.

Building a Boat is Great Sport

And the Brooks' System Saves Two-Thirds of the Ordinary Cost

The pleasure of owning a boat—going where you will on river or lake—is keen. But the pride of being the master-builder of your own boat—to know what you have under you—is a far greater satisfaction. And the building itself is recreation. The Brooks' Knock-Down System of building—from canoe to cabin cruiser—not only saves ⅔ of the cost but provides the best materials procurable and guarantees every part accurate—the whole absolutely right and seaworthy. Every Brooks' K. D. boat is sold on a Money-back guarantee.

Spare time Winter Evenings—a little money and you can easily triple the pleasure of your vacation days and leisure hours.

Only $28 For the Knock-down Frame of this 23-foot motor boat, including full-sized patterns and illustrated instructions to finish—speed 9½ to 14 miles an hour—12 passengers. *Free Boat Book* shows this and other models.

Brooks' Boat Book Free
—Write for It Today

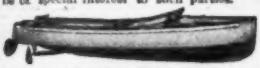
BROOKS MANUFACTURING CO., 8205 Sidney St., SAGINAW, MICH.

18 Ft. Launch Complete $142.50

WITH 3 H.P. GRAY MOTOR

No sport in the world will give you more real enjoyment for the dollar invested than motor boating—a clean—safe—invigorating sport that anyone can enjoy because of the low first cost and low cost of maintenance. Write for full details of this 18-foot launch—it is a wonderful value—get details of our new **boat buyers'** service and full information about various types and sizes of boats and prices complete with Gray Motor installed. Many people do not realize that motor boats are so simple and easy to operate and care for—that the up-keep cost is very low and that boats of practically any type can be purchased complete with Gray Motor installed—all ready to put in the water. Our boat buyers' service and boat builders' catalog will be of special interest to such parties.

A Clean, Safe, Health-Giving Sport



Here is Another Special 18 ft. Boat $285

A strictly high grade outfit complete in every detail. 6 H. P. Gray Motor for power—automobile control—reverse gear—mahogany trimmed—a seaworthy and handsome little craft that will make a speed of 12 to 14 miles per hour.

Model U

3 H. P. GRAY Motor—guaranteed to develop 4 H. P.—with Complete Outfit ready to install in boat **$55**

Gray Motors are standard the world over and are made in sizes from 3 to 36 H. P. 1, 2 and 3 cylinders for boats of all types and sizes. Prices advertised **always include** complete equipment—no extras to buy. Over 1000 dealers sell Gray Motors and give Gray Service. Write today and get a free copy of our valuable engine book "M" and boat catalogue "B."

GRAY MOTOR COMPANY

56 Gray Motor Bldg. DETROIT, MICH.

HORSE SHOW REPRODUCED AS TABLE DECORATION—During the last horse show in New York a novel table decoration was arranged for a small dinner party at one of the hotels. It comprised a reproduction of the tanbark ring at Madison Square Garden, with little horses, coaches, drivers and riders, all propelled around the circle by electricity. Judges, stable boys and other attendants were also shown in miniature.

The municipal authorities of Berlin have forbidden men to smoke while driving automobiles, ruling that many accidents have been due to the practice.

Motor Boaters

We have perfected a method of installing engine in boats, that gives more speed and makes installing simple.

Send for "Practical Information" and catalog of motor boat hardware and specialties.

MECHANICAL DEVICES CO., Watervliet, N.Y.

Little Giant

GASOLINE MOTORS

Are masterpieces of marine engine construction. They are light, powerful and extremely durable. They meet the requirements of every power boat owner because they are designed by experts and built by experts. Of the two cycle, three port type of construction, they are built in six sizes ranging in power from 1 1-2 H.P. up to 16 H.P. in single and multiple cylinders, the prices starting at $38.50 for the complete 1 1-2 H.P. motor. A catalog describing these "**Dwarfs in Size but Giants in Strength**" in a very interesting book and a copy will be sent to you free of all cost on your simple request. Write for it to-day—now.

Strelinger Marine Engine Co.
171 W. Woodbridge, Detroit

Typewriter Sensation

2 Dollars a Month

Buys a genuine Standard No. 2 SMITH-PREMIER Typewriter and at $72.20 less than the manufacturer's price.

Never before has anything like this been attempted. Dealers get $3.00 a month rent for this make of machine not nearly as perfect as the one we will send you, and you pay only TWO DOLLARS A MONTH AND OWN IT.

Send the Coupon and We Will Ship You This Smith-Premier Typewriter

When the typewriter arrives, deposit with the express agent $7.80 and take the typewriter three days and try it. If you find it to be the best typewriter you ever saw, satisfactory in every respect, keep it and send us $2.00 each month, until our special price of $27.80 is paid. If you don't want to keep it, return it to the express agent, and he will give you back your $7.80, and return the typewriter to us. We will pay the return express charges.

You won't want to send this machine back after you have seen it and tried it. You can't imagine the perfection of these machines till you see one, and the price is **$72.20 less than the catalogue price,** and it is guaranteed just as if you paid $100.00.

Perfect machines only, complete outfit, nothing extra to buy, no strings of any kind to this offer. Just think of buying such a typewriter for $7.80 down and $2.00 a month. Thousands of people have paid $100.00 cash for Smith-Premiers. **It's standard,** by many considered the best typewriter ever built. A key for each character, so each character is always the same; a type brush for cleaning the type built into the machine; the tilting carriage; comes to you with tools, rubber cover, everything ready. It runs beautifully. It's wonderfully simple and strong. It will last a lifetime. I sold a similar supply of these beautiful machines about a year ago to everybody's satisfaction.

Only 200 orders will be filled on this offer. Act today to be sure

The coupon states the terms. Fill it out, send it now, today. You can't lose, and it's the greatest economical typewriter opportunity you will ever have.

COUPON

HARRY A. SMITH, Dept. P,
No. 180 North Dearborn Street, Chicago, Ill.

Ship me a No. 2 Smith-Premier f.o.b. Chicago, as described in this advertisement. I will pay you the $20.00 balance of the **special** $27.80 purchase price, at the rate of $2.00 per month. The title to remain in you until fully paid for. It is understood that I have three days in which to examine and try the typewriter. If I choose not to keep it I will carefully repack it and return it to the express agent. It is understood that you give the standard guarantee for one year.

Name.....

Address.....

Shipping Point.....

Try This Infallible Plug in Your Motorboat

J-D Reliance Spark Plugs cannot be short-circuited by any motor, no matter how much carbon or soot forms on them. They even spark in water. A patented electrical action keeps the tip of the porcelain around the embedded platinum wire scoured clean as a hound's tooth. Price $1.00

Spark Plugs. A complete line for motor boats, automobiles, stationary engines, motorcycles. Write today for free illustrated list card.

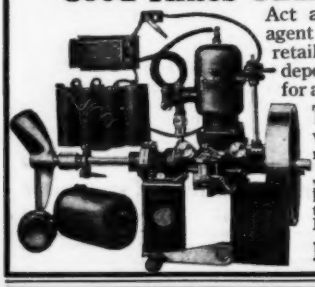
The Reliance is but one of the many *J-D* types. Another leader is the *J-D* Visible Gap with a window in the porcelain. It locates ignition trouble at a single glance. No more testing and fussing. Costs $1.00. The *J-D* Conical and Petticoat, at 75c, and with points of solid platinum-iridium at $1.25, in open and closed ends, are splendid values. *You will never get the best out of your motor until you use J-D plugs.* Write us today.

JEFFERY-DEWITT COMPANY, 21 Butler Avenue, Detroit, Mich.

Save a Season's Gasoline Cost Good Times Guaranteed

LA Motors Direct from Factory to You

Sold on their Merits



Act as your own agent and save the retailer's profit—buy direct from the factory a dependable Lockwood-Ash Motor guaranteed for a year. Six models, all sent on 30 days' trial.

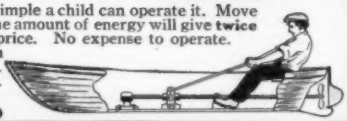
This 1½ H. P. Motor and Complete Outfit, $36.25 Freight Paid

We pay the freight and give you a month to test out the engine. You get a reliable motor with complete outfit, including propeller, ignition system and shaft, as shown. You save at least $13.75—a season's gasoline cost. Give yourself and your friends good times at small expense. Motor boating is a healthful, fascinating and economical sport. Write for our new 1913 catalog today. Post yourself on Motor Boating. Learn about the famous L-A Motors. The catalog's free—write today.

LOCKWOOD ASH MOTOR CO., 208 Horton Ave., JACKSON, MICH.

HYDRO-SPEEDO BOAT ATTACHMENT

Equip your **BOAT** or **CANOE** with our HAND POWER DEVICE. It is so simple a child can operate it. Move lever handle forward and backwards. It's easier than oaring, and for the same amount of energy will give **twice** the **speed** of the primitive method of rowing. Light in weight, cheap in price. No expense to operate. One or more persons can enjoy the sport without interrupting the operation of the others. A big boon to those who like boating and fishing. No noise. No danger of accidents. A perfect hand power unit anyone can install. Send for illustrated Circular and prices. Orders filled in rotation.



DUPLEX POWER DEVICES CO. (Not Inc.), 1119 Karpen Bldg., CHICAGO

$38.00 UP

Reliable—Dependable—Durable—Satisfactory

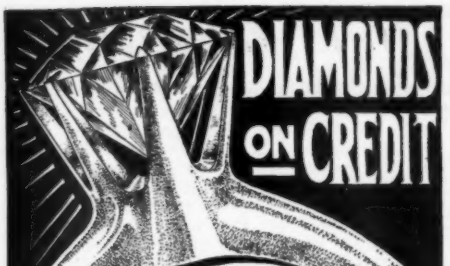
That's the GILE

When you put a GILE engine in your boat, you've got a motor on which you may rely to GO at all times. You can thoroughly understand it—it is so simple in design that it practically eliminates all repair expense, and so easily operated that your wife, mother, sister or sweetheart can readily run it, and it couldn't be of better material, design or construction if you paid three times the price we are asking. GILE engines are made only of the very best material, are of superior design, and expert construction. They are manufactured in one of the most up-to-date and progressive plants in the country, are carefully tested out, are RIGHT in every way, and FULLY guaranteed. They fill every requirement of satisfactory service, are durable, long lived, and in fact just the engine you've been always looking for—a motor which will "MOTE" wherever and whenever you want it or need it. Our prices will astonish you. Write for free catalog and further information—we know we can interest you.

(This is the 16-foot Ideal)

GILE BOAT & ENGINE CO.
10 Filer Street LUDINGTON, MICH.

16', 18', 20', 24', 26' $87.00 UP



DIAMONDS ON CREDIT

Would you Accept this special offer?

Positively Without an Equal!

Beautiful genuine Diamond Ring, perfectly white, extra quality, Ladies or Gents hand made 14k Solid Gold mounting, worth regularly about $50.00 each,

Special this Month only $37.50

If you have in mind buying a $50 or even a $60 Diamond, see this Special Ring before you buy. Our extensive handling of Elgin Watches throughout the world, enabled us to buy a big lot of these specials at about 30 per cent. below their actual value, and now offer them for only

$5.00 Down and $5.00 a Month

You assume no risk whatever because we send the Diamond for your approval before you pay one cent.

FREE DIAMOND BOOK! Write TODAY for our free Diamond and Elgin Watch Book. It's printed on our own presses and said to be the most attractive Catalog published.

HARRIS-GOAR CO.
Dept. 859, Kansas City, Mo.

MINNEAPOLIS A "MOVING-PICTURE" CITY—In Minneapolis statistics have been completed which show that three-fifths of the city's entire family population attend moving pictures. These figures are of more than local interest, for such conditions exist in other places. The popularity of the "movies" is summed up by the mother who said: "After a hard day's work moving pictures are the best relaxation."

Important Announcement

NACO, The National Camera, will be on the market May 1st, and will be sold direct to the consumer on the plan that has met with such great favor throughout the country. We will send it on free trial, and if you desire to keep it, you can have ten months' time to pay. Naco, The National Camera, is the best $20.00 value on the market and this easy payment plan makes our offer doubly attractive. Deliveries will be made in the order that they are received. Write today for full particulars — we will regard your request as a reservation.

NATIONAL CAMERA CO., 901 Lucas Ave., Saint Louis, Mo.

INVISIBLE SUSPENDER BELT

Fits instantly inside waist band, entirely out of sight. Does away with unsightly suspenders and uncomfortable belts. Keeps trousers up neatly, securely. Keeps shirt down, preventing "bagging." Wonderful for fat men or thin men. A Necessity for all men—mechanics, farmers, office men, professional men.

Ask your dealer. If he can't supply you, we will.

TRAVELING MEN—The Ko-Ko-Mo Suspender Belt is a real side line. Write "quick" for terms and territory. Send

50c

and your waist measurement for sample belt —or $1 for silk belt — and full details. Money returned if you are not entirely satisfied.

KO-KO-MO BELT CO. KOKOMO, INDIANA

Fifty Cents a Week Employs These Eight Engineering Experts

50c a week—$2.00 a month for but one year—will bring to your door a work which contains the condensed knowledge and experience of over a score of Civil Engineers—a work which will give you, without loss of time and at no expense, advice and assistance equal to that of the best experts and consulting engineers. With these books in your office—eight faithful, efficient and tireless assistants—you are prepared to cope with any difficulty, however great, that may arise.

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is compiled from the instruction papers used in the regular correspondence work of the school; contains 3,900 pages; 3000 illustrations, folding maps, diagrams, etc., with a special cross index for quick reference. The eight large volumes are bound in half morocco and are printed in large, clear type on special quality paper. This great work—a most complete review of Civil Engineering—will solve every problem likely to confront you in your daily work and will place the solution before you so clearly and concisely that you cannot fail to understand and profit by it.

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Drawing, Plane Surveying, Plotting and Topography, Strength of Materials, Masonry, Reinforced Concrete, Hydraulics, Waterways, Water Supply, Irrigation, Water Power, Sanitation, Highway Construction, Steel Construction, Roof Trusses, Practical Problems, Bridge Engineering, Railroad Engineering, Cost Analysis, Harbor and River Improvement.

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With every set is included a year's Consulting Membership, regular value $12.00, entitling you to the free advice of a staff of Civil Engineering Experts. This will give you practical help in handling working problems which are too specific to be taken up in detail in the Cyclopedia. There will be no limit to this service. A single problem solved for you might be worth more than the first cost of the books.

American School of Correspondence, Chicago, U. S. A.

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Please send Cyclopedia of Civil Engineering for 7 days' free examination. I will send $2 within 7 days and $2 a month until I have paid $24.80; otherwise I will notify you and hold the books subject to your order. Title not to pass until fully paid. Pop. Mech. 5-13

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$ MAKE 250.00 A MONTH REPAIRING AUTO-MOBILE TIRES

Be first to enter this new big paying business in your town. Open your pockets. Let the dollars pour in. Act quick. Every auto sold means more tires to mend. Automobile business is growing fast—enormous field for tire repairing. Punctures and blowouts are common. Tires need retreading and vulcanizing. Something going wrong all the time. Thousands forced to buy new tires because they can't get old ones fixed. Think of the old bicycle days—repair shops on every corner—all making money—busy day and night. Autos make same proposition over again—only ten times bigger and better. Users of Haywood Tire Repair Plants are making big money. Johnson, Tex., writes: **"I made as high as $18 profit in a day."** Another man who bought a plant September, 1911, writes he has **cleared over $3000.00.** That's going some! Operate a plant as side line in connection with auto business—garage or as an independent business. Find neighborhood where there's a bunch of autos—get all the steady business besides transient work. Experience unnecessary. You learn quick. Simply follow directions—practice a few days on a couple of old tires and you'll be ready to coin money. Business comes fast and easy.

Repair Tires at Home. Young men! and boys repair father's tires—get money he pays garage man. Get the neighbor's work. Make money to attend college or to start a garage and repair business. **Auto owners**—repair your own tires—save money—pay for your outfit in short time. We have outfits for home use. Anyhow investigate. Send today for catalogue. See the wonderful possibilities in this marvelous field. Learn of the enormous money-making opportunities in this fascinating new business.

HAYWOOD TIRE & EQUIPMENT CO., 624 N. Capitol Ave., Indianapolis, Ind.

$92.50—Our Price for Next 30 Days

We now offer the Edwards "Steelcote" Garage (1913 Model), direct-from-factory, for $92.50. But to protect ourselves from advancing prices of steel, we set a time limit upon the offer. We guarantee this record price for 30 days only. Just now we can save you $35 or more.

Edwards Fireproof Steel Garage

Quickly Set Up Any Place

An artistic, fireproof steel structure for private use. Gives absolute protection from sneak thieves, joy riders, fire, lightning, accidents, carelessness, etc. Saves $20 to $30 monthly in garage rent. Saves *time, work, worry and trouble.* Comes ready to set up. All parts cut and fitted. Simple, complete directions furnished. Absolutely rust-proof. Joints and seams permanently tight. Practically indestructible. Locks securely. Ample room for largest car and all equipment. Made by one of the largest makers of *portable* fireproof buildings. Prompt, safe delivery and satisfaction guaranteed.

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Postal sent today brings new 56-page illustrated Garage Book *by return mail.* Address

The Edwards Mfg. Co.
620-670 Eggleston Avenue, Cincinnati, Ohio

ONE-THOUSAND-MILE BEACH SPEEDWAY FOR THE GULF—A beach speedway, over 1,000 miles long, is proposed for the Gulf-coast country of Texas and Louisiana. All the way from Atchafalaya Bay on the Louisiana coast to the Rio Grande's mouth the

RANGER BICYCLES

Have *imported roller chains, sprockets* and *pedals; New Departure Coaster-Brakes* and *Hubs; Puncture Proof Tires: highest grade equipment* and many advanced features possessed by no other wheels. *Guaranteed 5 yrs.*

FACTORY PRICES direct to you are less than others ask for cheap wheels. Other reliable models from $12 up. A few good second-hand machines $3 to $8.

10 DAYS' FREE TRIAL We ship on approval, *freight prepaid,* anywhere in U.S., *without a cent in advance.*

DO NOT BUY a bicycle or a pair of tires from *anyone* at *any price* until you get our big new catalog and *special prices* and *a marvelous new offer.* A postal brings everything. *Write it now.* **TIRES, Coaster-Brake Rear Wheels,** lamps, parts, sundries, *half usual prices.*

Rider Agents everywhere are coining money selling our bicycles, tires and sundries. **Write today.**

MEAD CYCLE CO., Dept. L 108, CHICAGO

MOTORCYCLE SUPPLY CATALOGUE

LOWEST PRICES-LARGEST EVER ISSUED

In it we list 1242 guaranteed articles for the motorcycle owner at prices lower than others. We pay transportation charges. A $20,000 stock for immediate shipment. Motor repair parts at half price. You can't be up-to-date without our 1913 catalog.

For 4c, catalog will be mailed to you. Write today.

MOTORCYCLE EQUIPMENT CO.
MEGS BLDG **HAMMONDSPORT, N.Y.**

NEVERLEAK

Heals Punctures and Leaks
Prevents Flat Tires

A 4 oz. tube of Neverleak Tire Fluid injected into each of your tires will save you those aggravating tire troubles that are always catching you just when you want your wheel the most. It will save you expensive repair bills. Neverleak is a preservative of both the fabric and rubber of which bicycle tires are made. It prevents all trouble on account of tires being porous, will stop thread leaks or those caused by defective repairs, will instantly heal all punctures within the bounds of reason. Make the test and satisfy yourself. Do it today, don't wait for trouble.

Used and sold by bicycle repairmen and dealers in bicycle supplies everywhere

Buffalo Specialty Company
400 Ellicott St. BUFFALO, N. Y.

GOODYEAR AKRON, OHIO.

NO-RIM-CUT TIRES
10% Oversize—**save half** on tire bills—Write for latest Tire Book.

THE GOODYEAR TIRE & RUBBER COMPANY, Main Office and Factory, Akron, Ohio
Branches and Agencies in 103 Principal Cities. More Service Stations than Any Other Tire

beach will be logged as a direct result of the increase in winter tourists to those parts. The hard-packed sand of this section is constantly kept in perfect condition by moisture from the ocean for long stretches, some of which cover over 100 miles. Such a course would be

$40 Motorcycle

We have the largest line of new and used Motorcyles in the country at the lowest prices. We also have a thoroughly equipped repair department and are in position to furnish repairs for any machine. Send us your machine to be overhauled. We pay cash for second hand motorcycles. *Send for Catalog.*

HARRY R. GEER CO., 888 McLaran Ave., ST. LOUIS, MO.

Bicycles 50% Off

Factory Price until we close a retail dealer in your community. When retail dealer in your community takes hold of "America" line this offer positively ceases. Order **at once** and save **HALF.**

Famous "America" Wheels

Not "cheap" mail-order wheels. Not sold in a "cheap" mail-order way. Only wheel with Truss Frame, giving double strength, and Hygienia Spring Fork, taking up every shock. Comes complete. **GUARANTEED TEN YEARS (twice** the guaranty of any other wheel). Protection from thieves—protection from accidents. Satisfaction or money back.

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GET A
"SEARCH-LIGHT" BICYCLE LAMP

BURNS GAS

Makes its own gas and won't jar out

An inexpensive lamp of highest QUALITY. Gives very bright light. Handsome, strong, serviceable and beautifully finished. Can be attached to head or fork. Has adjustable bracket. Be sure to buy a "Search-Light." Ask your dealer. If he's sold out, write us. Send for illustrated catalog.

BICYCLE PUMPS

Get a Bridgeport Pump at your supply store or write and we will see that you are supplied. Send for catalog of pumps.

Bridgeport Brass Company
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Bridgeport, Conn.

EVERY CAR OWNER NEEDS THIS BOOK

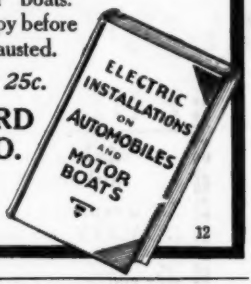
IT makes you intimately familiar with every electrical device on your car or motor boat. Tells you how to avoid electrical trouble, how to locate it and how to correct it. Written by experts in such simple terms that any one can understand it.

¶ The only book ever written that covers every phase of electric installation on automobiles and motor boats.

Write today for a copy before the edition is exhausted.

Sent postpaid for 25c.

THE PACKARD ELECTRIC CO.
Dept. X
Warren, Ohio



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Convert Your Bicycle into a Motor-Cycle using our Attachable Outfit. Fits any wheel. Also Marine and Stationary Motors and Finished Castings. Stamp for circulars. **STEFFEY MFG. CO.,** Girard Ave. and 30th St., PHILADELPHIA, PA.

5 H. P. 1913 Peerless Motorcycle

With Free Engine Idler and Bosch Magneto, together with the best there is in motorcycle construction—Power, Silence, Endurance, and those Wearing Qualities so essential for low cost of maintenance.
5 MILES FOR ONE CENT
Agents Wanted—Liberal Discounts

PEERLESS MOTORCYCLE CO., 179 Huntington Ave., BOSTON, MASS.

Carfare Pays For This Bicycle

What you save riding to work and for pleasure will **pay for** your "Rick-Made" bicycle—in one year—after that it will actually **put money in the bank** for you. The "Buffalo" is the best looking, easiest running and most durable bicycle made. Coaster brake, tool kit, long mud guards and bell given **without extra cost.** Has standard 45-position handle-bars, 3 spiral spring suspension seat, "Beats All Puncturepoof" tires, "Brampton" roller chain; mirror nickel and piano enamel finish, special hanger and other features making it the best bicycle buy—needs no repairs.

Guaranteed for L-I-F-E

Other New Bicycles $14.55 to $30

30 Days' Free Tryout

We express this bicycle, charges prepaid, so you can examine and approve it at your Express Co.'s office before you spend a cent. If then you are satisfied and certain it is as good or better than any $50 bicycle you ever saw, pay the Express Agent only **$27.55**—ride the bicycle for 30 days—then if you think you don't want it, we will promptly give you back your money and pay the return charges. Don't delay—or you'll forget—write now.

Send for "POCKET" CATALOG FREE Lowest Prices

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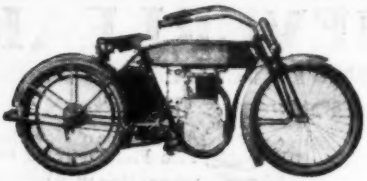

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Here's a Lighter, Stronger, Faster Motorcycle

Speed, comfort, quality and all that the term "Limited" signifies in connection with railway travel is embodied in this newer, stronger, faster, easier riding motorcycle—the

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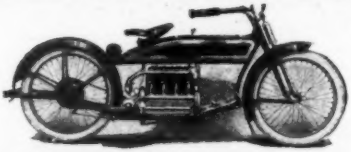

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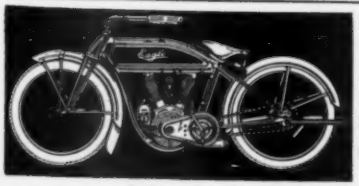

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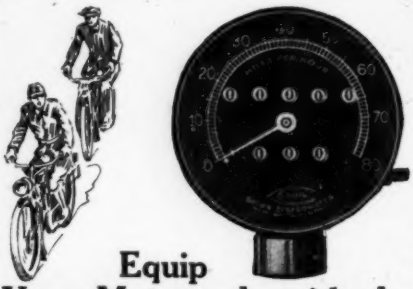

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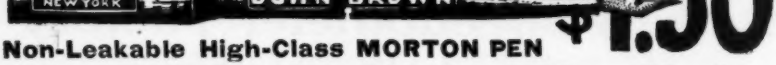

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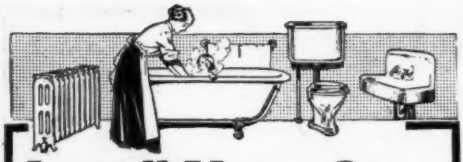

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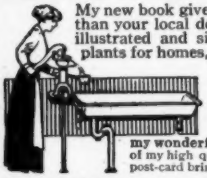

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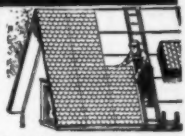

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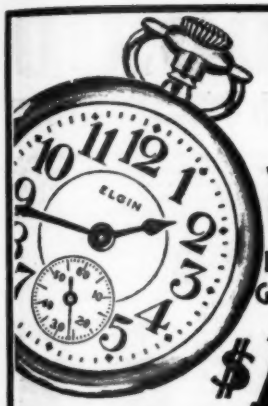


THIS 17 JEWEL ELGIN IN 25 YEAR GOLD CASE ONLY $12.75

30 DAYS FREE TRIAL

Now—during this Special Sale—is a splendid time to buy a fine Watch. We would like to send you this 17-Jewel Elgin in hand engraved 25-year gold case for your inspection. It sells regularly at $20.00. We save you nearly one half. If you answer this advertisement you can buy it for $12.75.

NO MONEY DOWN

We don't want you to send us one cent. Not a penny. Merely give us your name and address that we may send you this handsome Watch on approval. If after you receive it and want to keep it, then you pay us only

$2.00 A MONTH

If you don't want to keep it, send it back at our expense. You assume no risk whatever in dealing with us. You do not buy or pay a cent until we have placed the watch in your hands for your decision. We ask **NO SECURITY, NO INTEREST.** No red tape—just common honesty among men. If this offer appeals to you **WRITE TODAY for**

Our Big Free WATCH and DIAMOND BOOK!

HARRIS-GOAR CO.

Dept. 850 **KANSAS CITY, MO.**

THE HOUSE THAT SELLS MORE ELGIN WATCHES THAN ANY OTHER FIRM IN THE WORLD.

$3.00 A MONTH

Buys This Beautiful L. C. SMITH TYPEWRITER

Has Back Spacer, Tabulator, Two Color Ribbon, in fact every modern feature for the maximum convenience and operating efficiency.

Send today for the greatest typewriter opportunity ever offered.

HARRY A. SMITH, Dept. M, 180 North Dearborn St., Chicago

We Ship on Approval

without a cent deposit, prepay the freight and allow **10 DAYS FREE TRIAL** on every bicycle. **IT ONLY COSTS** one cent to learn our *unheard of prices* and *marvelous offers* on highest grade 1913 models.

FACTORY PRICES *Do not buy* a **bicycle** or a pair of **tires** from *anyone at any price* until you write for our new large **Art Catalog** and learn our *wonderful proposition* on the first sample bicycle going to your town.

RIDER AGENTS everywhere are making big money exhibiting and selling our bicycles. **We Sell** cheaper than any other factory.

TIRES, Coaster-Brake rear wheels, lamps, repairs and sundries at *half usual prices.* **Do Not Wait;** write *today* for our *latest special offer* on "Ranger" bicycle.

MEAD CYCLE CO. Dept L 108 CHICAGO

Box of Havana Cigars only 50c

This box of Spanish cedar contains five of the most superb Tampa made cigars ever offered to the American public. The Juan del Rey private box brand. We have prepared this special lot of boxes of five Juan del Reys to send out by parcel post to men who want the finest smoke the supreme tobacco fields of Cuba can afford. Send the coupon below and get five of the finest cigars you ever smoked or offered to a friend.

Finest Cuba Grown

The Juan del Rey is made of the finest grown Cuban leaves, all Havana. It is made exclusively for fine box trade. It is not handled by jobbers. We own and control the brand and sell them exclusively to gentlemen who appreciate the most delicately rich quality at the price of an ordinary 10c cigar. The saving when measured by quality is very great. Send the coupon today and get a sample box of five magnificent Havana cigars.

To Introduce Supremely Fine Cigars

We will send this box of cigars by parcel post direct to your office or your home. The price on these five cigars is the same as if you had bought a full box of fifty. We pay the additional cost and expenses to introduce this cigar to you. If you have been paying more than 10c for your cigars you owe it to yourself to prove to your own taste that we have the finest cigar at a moderate price ever offered.

Special Offer

For a limited time we will send this specially packed box of five Club House cigars to enable you to sample the quality of the Juan del Rey private box brand. We have built up our great private box trade over the United States by the elegance of quality, the saving in price and the highly satisfactory advantages of dealing direct with us. We feel sure we will have you for a regular customer if you will try this sample box.

Send Coupon

Send this coupon and enclose with it only 50c. Send money order stamps or silver or check We will send you also full illustrated description of the Juan del Rey line of cigars, also description and sample of French's Mixture, the "aristocrat of smoking tobacco." If you enjoy a fine pipe smoke send anyway for free sample of French's Mixture. Send while this special cigar offer is open Send today.

French Tobacco Co., Dept. 15 Statesville, N. C.

50c Coupon

French Tobacco Co., Dept. 15, Statesville, N. C.

Gentlemen:—Enclosed herewith is 50c for which please send me by parcel post all prepaid a Spanish Cedar box containing five Club House Juan del Rey cigars guaranteed to be the finest Cuban grown Tampa made cigars, suited to men accustomed to fine Havana cigars.

NAME.....

ADDRESS.....

Light ☐ Medium ☐ Dark ☐ Sample Smoking Tobacco ☐

AGENTS! $1200.00 in Cold Cash

Made, Paid, Banked in 30 Days, by Stoneman—$15000 to Date.

LISTEN This opportunity is open to *you*—this money—the cold cash—can be *yours*. We want 5,000 good men immediately. The opportunity is open for acceptance today. You, and you alone, by waiting too long, can lose it. No experience necessary. Business supplies capital. Get complete facts at once. *Ask to be shown.* Get in line. Make 1913 the biggest you have ever lived or dreamed of. You don't have to wait a month — not even a week — *payments can start the first day;* and you can work into a position which enabled R. V. Zimmerman, a farmer of Indiana, to order

$13,245.00 IN 110 DAYS

We have been quietly securing men from all walks of life—ministers, clerks, farmers, doctors, lawyers, teachers, etc.—enabling them with our co-operation and $50,000 APPROPRIATION, to get what we here offer and can do for you. Some of these men you may know—possibly have envied their prosperity without understanding the reason of their success. 1913 will break all records — agents actually getting rich. Think of these figures: Langley (liveryman), $115 FIRST DAY; Rasp (agent), $1,685 in 73 days; Beem (solicitor), $164.25 WEEKLY FOR 12 WEEKS; Korstad (farmer), $2,212 in a few weeks; Juell (clerk), $6,800; Hart (farmer), $5,000; Wilson (cashier), $3,000 IN 30 DAYS. Let us refer you to these men—to the U. S. GOVERNMENT, to banks, business houses, noted people at home and abroad — let us tell you about our startling plan of universal distribution through special representatives which absolutely insures

$1000.00 Per Man, Per County

You, by acting NOW—TODAY—can get this proposition for your section. This is not a fairy tale, fake, or humbug; for, LISTEN—IT IS GOING ON DAILY.

If you can use $1,000.00—real money—SAY SO. Don't hesitate—don't delay a minute, but get the thousand-dollar hustle—get your first thousand dollars—first start—first taste of REAL INDEPENDENCE — POWER, INFLUENCE, LUXURIES. Join hands with us and enjoy abundant prosperity. So get mighty busy—write today. It costs nothing but a cent to find out all about it and to receive absolute proof.

Investigate and Be Amazed

Find out how Oviatt (Iowa minister) ordered over 800 outfits in 11 days; Cook (solicitor) $4,000 to date; Rogers (surveyor) $2,800. He writes: "Selling baths has got me one piece of property, expect to get another." Learn how O. P. Schleicher, Ohio (minister), received $195 TWELVE HOURS AFTER APPOINTMENT. Hundreds share a similar prosperity—banking money—buying homes, automobiles. Hoard (doctor) $2,200. SAME APPOINTMENT SHOULD MEAN SAME MONEY TO YOU. Rise to big earnings, wage freedom, ownership and private monopoly. KNOWING THE REASON DISPELS ALL DOUBT.

Risk One Cent to Make Thousands

And say with Lodewick, Maine (solicitor):—"Lucky I answered your ad. It's great—money coming fast—17 orders to date—sells on sight." Why should not Cashman say: "The man who could not sell your goods could not sell bread in a famine." Get a postal card—put your name and address on it this minute—drop it in the mail box, addressed to us today. Heed this caution from Chas. Starr, of Michigan, who writes: "Sorry this field is closed—SHOULD HAVE ACTED SOONER, but was skeptical. Your local man's GREAT SUCCESS has set everybody talking and proves I WAS A CHUMP. WONDERFUL WHAT A MAN CAN DO WITH A REAL OPPORTUNITY."

SEND NO MONEY Business supplies capital. Credit given to active distributors. Investigate first. Asking to be shown doesn't obligate you one bit. Just spend one cent today — ACT NOW—BE FIRST. Don't let somebody else get the territory you want. We want 5,000 good men to act as our special representatives immediately—send your application by the **FIRST MAIL.** Just a postal card will do. Send it now.

THE ALLEN MFG. CO., 3682 Allen Bldg., TOLEDO, OHIO

Strange Invention

Gives every home a bathroom for only $6.50; excels others costing $150 to $200. Abolishes tubs, bowls, buckets, wash-rags, sponges. Turns any room into a bath-room. WITH HOT OR COLD RUNNING WATER. Cleanses almost automatically. No plumbing—no water works—self-heating. Gives cleansing, frictional, massage and shower baths. So simple a child can operate. Truly marvelous. A modern home-bathing, without drudgery, inconvenience, muss or lugging water, filling up, emptying, cleaning, putting away. Could anything be more popular? Think of the millions who want bathrooms! At sight, people exclaim, "There, there, that is what I have been looking for!" OVER 200,000 DELIGHTED CUSTOMERS—Used by U. S. GOVERNMENT. Think what you could do with this in your territory. No competition—fascinating—high-grade business.

"BUFFALO" MARINE ENGINES

If marine engine efficiency has any interest for you do not fail to get the 1913 "Buffalo Book."

It describes fully the "Buffalo" line of four-cycle gasolene and kerosene engines—3 to 150 h. p.—for work boats, speed boats, launches and cruisers.

BUFFALO GASOLENE MOTOR CO.
1293-1305 Niagara Street, BUFFALO, N. Y.

"Odd Jobs"

bob up at house-cleaning time which really require a Bench and tools. With a Grand Rapids

HOME BENCH

many things can be "fixed" with convenience and pleasure that now require the expense of a mechanic.

Thousands of well regulated homes have a home bench — why not you?

Send today for free catalog of all styles and prices.

GRAND RAPIDS HAND SCREW CO.
1620 Front Ave., Grand Rapids, Mich.

If you want one of our Stone Blotters send 15c when writing for catalog.

GO INTO THE MOVING PICTURE BUSINESS

$20.00 AND MORE PER NIGHT CAN BE MADE ANYWHERE WITH OUR MACHINE

It is a startling fact that in hundreds of cities and small towns, are young men who have gotten rich from running Moving Picture Shows, having started with but little money.

There is a fortune in your own, and surrounding towns waiting for the first man to show our **FLICKERLESS** moving pictures. Don't let someone else take this big income. Rent a store, a hall, a church, a school-room or a discontinued garage, put in a **"MARVEL"** and watch the people flock in to see the new **FLICKERLESS** Moving Pictures.

We furnish you with a complete outfit, **"MARVEL"** machine, Films, Supplies, Circulars, Tickets and **HOW TO GO ABOUT IT.** Don't delay, write at once for full information, **FREE.**

WITH A "MARVEL" YOU'RE BOUND TO SUCCEED

MARVEL MOTION PICTURE MACHINE CO.
Corner Farmer & John R. Sts. DETROIT, MICHIGAN

MUD SPLASHING PUNISHABLE IN SAXONY —Mud splashing is held to be a punishable offense in Saxony, and the motorist has but two alternatives when the roads are muddy. He must either confine his speed to a walking pace or wait until the mud dries up or freezes, otherwise he is liable to run afoul of the laws. In the last case before the Dresden Court of Appeals the driver was adjudged to have committed an offense against the traffic regulations in that he did not slow down when passing through mud, but he was dismissed with just a reprimand for the simple reason that no one had been near enough to get spattered.

WHITE ZIRCON

The only substitute for diamond showing a magnificent play of color. Cuts glass and resists fire and acid tests. **A natural gem** mined only in Ceylon. **Far superior** to white sapphire or topaz. **Guaranteed satisfactory** at one-twentieth the price of diamond. Mounted in solid gold and platinum. **Sent free for examination.** Catalogue and "Facts About Gems" by Prof. G. M. Butler of the Colorado School of Mines, mailed free.

THE ZIRCON GEM CO., 425 Boston Bldg., DENVER, COLO.

GRAY MOTORS FOR BOATS

Largest Builders of 2-cycle Motors in the World. Over 1000 responsible dealers.

3 H.P. with Complete Outfit ready to install $55
ALSO 4½ TO 36 HP

Guaranteed by a big responsible concern. Write for big catalog—*tells* and *shows* you all about these high grade motors and how they are made.

GRAY MOTOR CO., 588 Gray Motor Bldg., Detroit, Mich.

ANTI-CRANK

LACKA-MOTORS

½ to 45 H. P. for all boats. **THE WORLDS SIMPLEST** Installed Operated by anyone. Complete Outfits ready for Rowboat or Schooner. GUARANTEED TWELVE YEARS building, perfecting, success with THE ONE TYPE. Write to Originators of VALVELESS for new "MARINE BOOK," a liberal Educator to all, free. Address Department M. LACKAWANNA MFG. CO., Office and Factory, Ballston Spa, N. Y.

Thin Model 17 Jewel Movement

25-Year Guaranteed Gold-Strata Case

Send for This Watch On 7 Days' Free Trial

To Popular Mechanics Readers who mail coupon below at once we will send this beautiful "Thin Model" 25-year guaranteed gold-strata watch, on 7 days approval without one cent in advance —but YOU MUST BE QUICK.

This superb Watch is indeed a triumph in the art of watch-making. The photograph above shows the actual size of the Watch. The movement is the famous 17-jewel Illinois Movement which has no superior throughout the entire world. This Watch is not only a perfect time-keeper, but the graceful thin model gold strata case lends it a beauty and distinction which will make it a constant joy to you every time you look at it.

Payments—Only $2 a Month

This is the greatest "watch value" in America, but we do not ask you to take our word for it. Our plan is to send you the Watch on approval so that you can see the Watch itself, examine it carefully and wear it for a week before paying us any money or obligating yourself in any way. We do not want you to send us one cent now. Just fill out and mail coupon below and we will then send you the Watch carefully packed, express prepaid. After you have worn this beautiful Watch a week, if you decide to keep it, you may send us only $2 cash and then $2 a month for 10 months thereafter. But if the Watch is not satisfactory and you do not wish to keep it, then you may return it to us "express collect." So, you see, **you take absolutely no risk.**

Free Monogram Offer

To those who mail coupon below promptly, we offer to engrave by hand, their initials on the back of this watch in exquisite ribbon monogram letters. So then, if **you** answer promptly, you may have **your own** initials handsomely engraved by hand on the back of this superb watch, **free of charge.** Jeweler's regular charge is from $1.50 to $2.00, but if you are prompt, we will do it for you **FREE.** This is a great opportunity — one that you must not miss. **Tear off and mail coupon at once.**

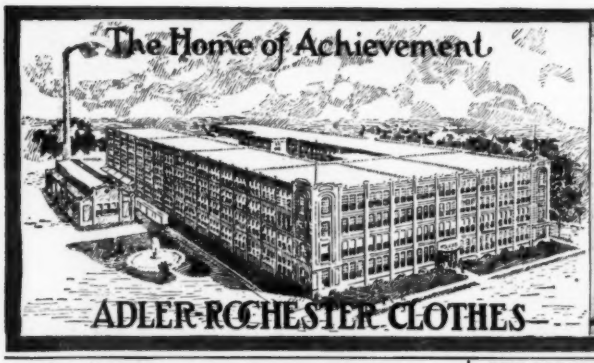
LACLEDE WATCH CO.
1127-29 Pine St.
St. Louis, Mo.

LACLEDE WATCH CO.
1127-29 Pine St.
St. Louis, Mo.

Send me for examination, your 17-jewel 25-year guaranteed gold-strata Watch, express prepaid. If the Watch is satisfactory I will send you $2 as first payment and $2 a month thereafter until your special price of $22 is paid. If the Watch is not satisfactory and I do not wish to keep it, I will notify you within 7 days and the Watch is then to be returned at your expense, as offered Popular Mechanics Readers. (NOTE. Print initials you wish engraved in monogram, on edge of coupon. If you prefer back of the watch wrought in special floral design instead of monogram, write us to that effect.)

NAME.....

ADDRESS.....



You can have the best style, tailoring, and woolens by demanding Adler-Rochester Clothes

L. ADLER BROS. & CO.
Rochester, N. Y.

Write for our Style Book giving the correct Spring and Summer, 1913 Styles and Dress Suggestions.

THE
Baldwin Camp Lamp

Gives a white penetrating light. 2½ inch high. Weight ready for use, 5 oz.

Burns acetylene gas. Will not blow out. Absolutely safe.

Can be fastened on cap or belt, carried in hand, or stood on table. No oil or grease.

The Baldwin Camp Lamp makes nights in camp just as pleasant as during the day because it gives the best artificial light next to sunlight. Rowing or canoeing at night is made safe. On "hikes" through the woods it is unequalled because it projects its light 150 feet and prevents stumbling and bad falls over obscure obstacles. It makes automobile repairing an easier, pleasanter task.

For sale by leading Hardware and Sporting Goods Dealers—sent prepaid on receipt of price. Brass, **$1.00**; highly polished nickel with hinged handles, **$1.50.**

Send for free illustrated catalog and instructive booklet "Knots and How To Tie Them." Give name and address of your dealer.

JOHN SIMMONS CO.
34 Franklin St., New York City
52 St. Nicholas St., Montreal, Can.
242 Mansfield Block
San Francisco, Cal.

Learn the new profession Tree Surgery

Not overcrowded and offers splendid and unusual opportunities to honorable young men. Ages 20 to 28. Students must have attended high school, and be physically sound and of good character. After completing two years' course, good men make $1,000 to $5,000 a year. Positions guaranteed to good men after graduation. Every city, park, orchard and private estate needs an Expert Tree Surgeon. Positions open also with established companies or State and National Governments. Special attention to Fruit Growing. Tuition moderate, including first year's board. We pay salary second year. Write promptly for full particulars. Address the Secretary.

DAVEY INSTITUTE OF TREE SURGERY
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Brand New Typewriter

Bennett $18 Portable Typewriter, marvel of simplicity, speed, efficiency, does work of $100 machines. All important improvements, visible writing, standard 84 character keyboard, etc. Slips in grip or pocket. Durable low-priced because only 250 parts. Others $700 to $700. Write at home, office, on train, everywhere. No special desk needed. Made by experts in same factory where $175 to $1000 Elliott-Fisher Billing Machines are made. Can send parcel post. Sold on money-back-unless-satisfied guarantee. Send for catalog. Special offer to live agents.

Q. C. BENNETT TYPEWRITER COMPANY
366 Broadway, New York

The Handy-Andy Electric Lantern

Gives a Bright White Light on the Darkest Night

Adapted for the Farmer, the City Man or Woman, the Motorist, the Yachtsman, the Watchman, the Woodsman, the Miner, the Camper, the Country Doctor, the Hunter, Warehousemen, EVERYBODY; — to Use ANYWHERE, at ANY TIME

A Wonderful Invention made possible by the high development of the metallic filament Electric Lamp. A marvelous Electric Bulb enables one to use any cheap "No. 6" Dry Battery (the same that is used on door bells) and obtain a Bright, Strong, White Light to see by.

The "Handy-Andy Electric Lantern" replaces the stinking, smoky kerosene lantern, which is always troublesome, dirty and dangerous.

Just think of it. You can buy a cheap "No. 6" Dry Battery of any make. Set it in the "HANDY-ANDY ELECTRIC LANTERN." Turn on the switch and have a LIGHT that illuminates hundreds of feet ahead. You can burn it for hours continuously because this wonderful metallic filament Electric Bulb uses so very little current that an ordinary Dry Cell will last from six months to a year, depending on the service that you give the Lantern.

A 15 Cent Dry Battery is Good Enough, though the 25 Cent kind will be better. Even a Discarded Dry Cell that a Motorist has thrown away will give good service in this lantern, providing the Battery is not "dead."

The marvelous Bulb is protected by mechanical means and no jar or ordinary use to which the "HANDY-ANDY" is subjected will break it. If a Bulb should be broken through carelessness, we will mail you one postpaid for 40 cents.

At the price that the "HANDY-ANDY ELECTRIC LANTERN" is sold, you couldn't afford to buy a cheap tin contraption or glass chimneys for a dirty, smoky oil lantern.

Be convinced. Buy it of your Jobber. If he does not sell it order direct from us. We will send it to you via PARCELS POST for $2.50 less the Battery, which you can buy from any dealer.

We Want AGENTS and SALESMEN that are live wires. If you are ahead of the "tallow-dip" and "pine-knot" days, you will quickly see that this is the best selling proposition out. You will have to show us that you are wide-awake before we will even consider giving you any agency, and you must act quick before some real live money maker beats you to the selling of this ELECTRIC LANTERN.

P. MEAD MFG. CO., 3906 Sheridan Road, Chicago, Ill.

Do your own Grinding

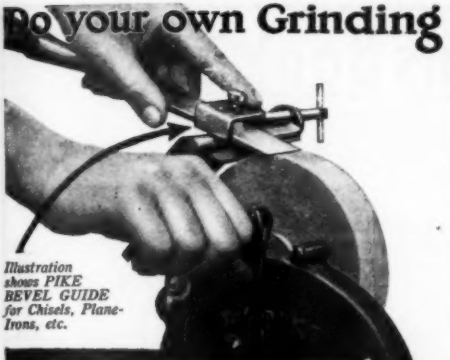


Illustration shows PIKE BEVEL GUIDE for Chisels, Plane-Irons, etc.

It's cheaper. Besides sharp tools save money by doing quicker, better work. No "know how" needed. With the PIKE BEVEL GUIDE, even a novice can grind as true as an expert. Patented and found only on the

PIKE PEERLESS TOOL GRINDER

They cut steel so easily that in a few moments you can make a hatchet, a chisel, a scythe, a hoe or an axe as keen and quick as when new. **Pike Peerless Junior $5. Pike Peerless Senior, $7.** *Guaranteed forever against all mechanical defects.* Other Pike Grinders from $3 up. Send for booklet "A Sharp Edge in a Hurry."

FREE A PIKE STONE. Send your dealer's name and 4c for packing and mailing and we will send a Pike, India Yeast Pocket Stone, also our famous book "How to Sharpen." You will be pleased. Write today.

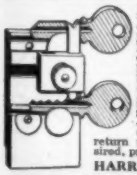
PIKE MANUFACTURING CO., 100 Main St., Pike, N.H.

An electric alarm that gives warning when a mine roof begins to move has been invented by an Australian.

Build Model Aeroplanes A fascinating pastime. Get "IDEAL" Plans and Drawings which are accurate, with clear, concise building instructions. PRICES—Wright 5 ft. Biplane, 25c; Herlot 3 ft. Monoplane, 15c; "Cecil Peoli" Champion Racer, 25c; Curtiss Convertible Hydroaeroplane (new), 35c; Nieuport Monoplane (new), 25c. COMPLETE SET OF FIVE $1, postpaid.

40 pp. Ideal Model Aeroplane Supply Catalogue 5c

IDEAL AEROPLANE & SUPPLY CO., 82-88 West Broadway, New York



Duplicate Keys Made in One Minute By the Harrison Key Filing Machine

Invaluable for Machinists, Building Superintendents, Repair shops, Locksmiths, Carpenters, Master Mechanics, Janitors, Garages, etc. Anyone can make a perfect duplicate key without injury to original or master key, to fit any pin tumbler lock—Yale, Sargent, Norwalk, Reading, Russell & Erwin, Corbin, Vassar, Etc., Etc. A customer writes:—"We made 65 keys in 1 hour and 16 minutes. Can you beat it?" Price $3.00 for machine complete with two filing guides and our new model clamp attachment. Remit by Post Office Money Order or New York Checks. Shipment by return mail postpaid. Diamond files furnished at cost if desired, price 35c. Send for circular telling all about this machine.

HARRISON & COMPANY, 81½ New Street, NEW YORK

UNDERFEED
FURNACE OR BOILER
Cuts Your Coal Bill
½ to ⅔

DIVIDE your heating cost last winter by two or even three—that's what it will cost next winter if you put in an Underfeed.

THE PECK Williamson Underfeed FURNACES BOILERS

Produce in coldest weather **more** heat, **cleaner** heat and more **even** heat than any other heater. Require least attention in feeding, regulating and cleaning. Let us prove it. Mail coupon for FREE Book.

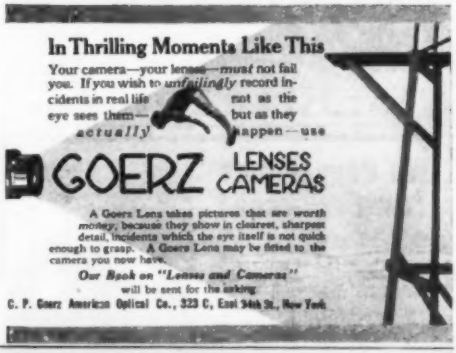
THE PECK-WILLIAMSON COMPANY, 398 West Fifth St., Cincinnati, O.

Send me FREE **UNDERFEED** Furnace Book..... Boiler Book.....
[Indicate by X Book you desire]

Name.....
Address.....
Name of my dealer.....

In Thrilling Moments Like This

Your camera—your lenses—*must* not fail you. If you wish to *unfailingly* record incidents in real life not as the eye sees them—but as they *actually* happen—use



GOERZ LENSES CAMERAS

A Goerz Lens takes pictures that are *worth money*, because they show in clearest, sharpest detail, incidents which the eye itself is not quick enough to grasp. A Goerz Lens may be fitted to the camera you now have.

Our Book on "Lenses and Cameras" will be sent for the asking

C. P. Goerz American Optical Co., 323 C, East 34th St., New York

WALTHAM WATCHES ON CREDIT
Your Monogram Engraved FREE
Sent On 30 Days Trial-No Money Down

$3.50 Monogram, Name or Initial FREE. Engraved and sent on approval, express paid, before you pay one cent. **Gold cases guaranteed for 25 years,** fitted with high grade **Waltham** movements or standard makes. **30 days Free Trial,** all at my expense. The test that tells. Your risk nothing. **Rock Bottom Payments.** Terms smashed. No red tape, no publicity. **Write now for Beautiful FREE catalog.** FREE engraving offer. **No** Money Down, FREE Trial Plan.

SQUARE DEAL MILLER, Pres., Miller-Hoefer Co., 156 Miller Bldg., Detroit, Mich.

CANADIAN OFFICE, WINDSOR, ONTARIO, CANADA

Shall I Send You This Book?

It tells how to make money in a new, easy, fascinating business. The same business made me independent. If you are ambitious to make a big success in life—if you are striving to get out of a rut and make money, I'll gladly send you a copy of my book **free.** This isn't a book for curious folks who "just want to see what it's like"—it's a book packed full of valuable information and ideas and helps on how to make money. If you're in earnest—if you want to "get there" write me today for this book. A two cent stamp brings it.

This is a recent picture of the man who made $1500 in one month with a Long Crispette machine, in a store window.

Make Money Manufacturing Crispettes

Nearly 4c Profit in Each Package

Crispettes are a new, delicious popcorn confection. Nothing like them in shape, taste or quality. Instant hit everywhere at parks, resorts, pavilions, circuses, fairs, carnivals, on trains, at depots, theatres, moving picture shows, confectionery shops, etc. My book tells how to make them—how to sell them. I've started others. Let me start you. Just read these extracts from letters—all recent.

Wm. Budd Leitch writes: "Started business New Year's day. Since then I have done a good business. Am well pleased with results."

G. W. Sperbeck says: "I am having fine success with the machine and getting more trade every week. Got the work down fine now."

D. B. Barrett writes: "I sold my interest in the Crispette Machine we bought, to my partner and have regretted it ever since. Send me new book."

My Offer Is For YOU
Send for the Book

This is the Machine That Did It

E. M. Cox says: "Have been running almost three weeks and supply the demand only by running steadily through the day. Selling everything I can make and getting it out good too."

No special seasons. All year 'round proposition. Book tells how to work it. Join the money makers. Be one of them—not an onlooker. Anyhow, investigate. Drop me a line today, and I'll send you the book, all charges paid.

SEND FOR THE FREE BOOK

W. Z. LONG, 754 High Street, Springfield, Ohio

KEYLESS PADLOCK

No knobs to turn—no clicks to count. Press the buttons and it flies open—40,000 combinations possible. Operated as easily in dark as in light. Solid brass. **AGENTS making 100% profit.** Sells on sight—no competition. Sample free to workers. Write today. Address

American Keyless Lock Co., 653 Jackson Blvd., Chicago

When properly cared for, brass dies for printing on wood have been known to run between two and three million impressions before wearing out. Such dies should be cleaned after every 2,500 or 3,000 impressions.

We Cannot Cure Your Back-ache!

Send stamp for catalog

BUT, we can help you to prevent it by inducing you to purchase one of our small household engines to do the back-ache producing work.

We make them in three sizes, ¼ H. P., ½ H. P. and 1 H. P. Every family needs at least one of them. They are perfectly safe in the hands of women and children. They operate on gasoline, kerosene or alcohol—are reliable, durable, silent, and economical. So many different kinds of work can be done with them that we want you to send a stamp for our catalog, so we can tell you all about them, and how ridiculously low priced they are.

ELGIN WHEEL & ENGINE CO., ELGIN, ILL.

NO MORE MOTOR BOAT EXPLOSIONS

TWO DOLLARS MAKES YOUR GASOLINE TANK AS SAFE AS WATER

The McNutt Safety Bung can be installed in tanks of all dimensions, making the same non-explosive. Safety Screw Cap prevents vapor from leaving the tank but permits air to enter as required to break vacuum. The prevention of the vapor alone will save cost of installation. Navy Department is equipping Dreadnaughts, Battleships and smaller vessels with this device. Write for further information or order today specifying size of opening, thread and depth of tank. Average size supplied for $2.00 expressed prepaid.

McNUTT NON-EXPLOSIVE CAN CO., 352 Pearl Street, NEW YORK

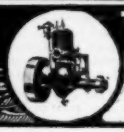
A Sure—Big Money Maker

Pound of sugar makes 30 five cent packages delicious candy—sells like wildfire—eighth season—thousands used—original investment returned many times over first season—

Empire Candy Floss Machine

making sure big profits everywhere. POP-CORN—PEANUT ROASTER—ICE CREAM CONE MACHINE—sure winners. Agents Proposition Extraordinary.

STEVENS MANUFACTURING AND SUPPLY CO.
Dept. P. M.—Fisher Building, CHICAGO, ILL.



TOLEDO MARINE MOTORS

The kind that make boating a pleasure. When you start you know there'll be no engine troubles to mar the trip. A marvel of smooth working simplicity that the non-mechanical can easily understand and operate. Complete, guaranteed. 2 cycle, 2 port 1-2x3 1-2, 4 1-2x4 1-2.

3 H. P. 1 cyl.,	$ 65.00
6 H. P. 1 cyl.,	84.00
6 H. P. 2 cyl.,	125.00
12 H. P. 2 cyl.,	160.00
18 H. P. 3 cyl.,	250.00

Write today for catalog.

THE UNIVERSAL MACHINE CO., Pike Ave., BOWLING GREEN, O.

Wanted

AGENTS & SALESMEN

THE SWEDISH VIBRATOR

An amazing scientific invention. Endorsed by physicians, athletes, actresses, judges, and thousands of men and women who have used it. Agents and Salesmen are wiring orders. Enthusiasm is unbounded. Every man and woman making money fast and easy. 900,000 already sold. 1,000,000 to be sold this year. Secure territory at once. Mail your application today, stating county you desire. This is the one important thing today—do it now.

This is an opportunity for you to make $5000 this year as a high grade salesman. **No experience necessary.** No delay. No charge for Territory. No competition. **Exclusive field.** Success assured. **Remarkable offer.** Read every word carefully. Get an appointment and get started without delay.

We are appointing men every day to manage our business in local territories. **We need good, honest men who are willing to work**—and we will give you today this opportunity to

Make $5000 This Year

It is the chance of a lifetime. You will be in business for yourself. **You will be your own boss—independent, abundant money, pleasant position**—and your time will be your own. **At home or traveling—all or spare time**—get an appointment immediately and commence earning money next week.

FRANK CHANCE, Manager New York American League: "After seeing how it removes stiffness and soreness from my arms, legs and fingers, each player absolutely insisted on having one; and had it cost twice as much they would have had it."

Champion Wrestler of the World uses the Swedish Rhythmic Vibrator and says:

"For limbering up, keeping in condition and strengthening the muscles, there is nothing that equals or excels the use of the Swedish Electric Vibrator. I always use one in my training and I certainly find it a wonderful help. It reaches the seat of all stimulation and gives me a perfect circulation. Its use gives all the muscles elasticity, makes one powerful, quick and active.

"Being a firm believer in vibratory massage, I tried various makes of Vibrators, but did not find one of enough efficiency to withstand the severe use I put them to until I purchased yours. You have, in my opinion, the only perfect Vibrator on the market, and I can consistently recommend its use to all athletes and those who desire health and strength."

The Swedish Vibrator

Most amazing seller ever invented. **A new proposition for salesmen.** Endorsed by the highest authorities of the world. A machine for home massage and vibratory treatment. Can be operated by simply attaching to electric lamp socket, or by ordinary dry batteries—**in cities, towns, country—anywhere, everywhere.** Needed by every man, woman and family. **Anyone can use it.** Get complete literature **free** and learn the wonders of this brilliant invention—a machine that gives 30,000 thrilling, invigorating, penetrating, revitalizing vibrations per minute. One-minute demonstration gets the order. **Irresistible desire to own it once you feel the living, pulsing touch of its rhythmic vibratory motion.** Sold upon five-year, cash certificate guarantee and 30 Days' trial.

ELSIE JANIS, the dainty and popular actress, says: "The nice things I could and do say about your vibrator, I cannot write, as I would not have space enough."

150% Profit

Throw away the little novelties upon which you have to make ten or twenty sales a day to pay expenses. Become a real salesman and make real and quick and big money. **One sale a day means $90 net profit a week.** Many averaging four, five and even ten a day. **This is actually the most brilliant, easy and high class proposition that has ever been offered to wide awake agents, general agents, and managers.**

JULIA SANDERSON says: "I don't see how I got along without it. It certainly is far better than anything I ever tried for the throat and vocal cords."

THIS OPPORTUNITY

is open to anyone who wants to make money and who is willing to work. We furnish complete instructions that enable you to start immediately. Nothing difficult. No experience required. We want applications from men and women in unoccupied territory everywhere—clerks, teachers, mechanics, farmers, etc., etc.,—all can make money on this grand, new, easy selling plan. Act today. Put your name and address on a postal card and mail it at once. Find out all about this tremendous opportunity.

Don't Delay

Get free literature and complete information at once. Send just your name and address on a postal card and all will be mailed **free** immediately. **Agents' sample furnished at wholesale price. Investigate.** It costs you nothing to find out. Territory being rapidly assigned. **But one man allowed in a field.** Give the name of your county. Send your name and address today. This is a brilliant opportunity. Do not neglect. Do not put it off. **Act immediately.** Address

WM. H. CRANE, the famous American actor, says: "I have been using your vibrator for several weeks for nervous trouble, circulation, etc., and found it exceedingly beneficial. It is all that you claim for it."

THE SWEDISH VIBRATOR CO., Dept. 87, 215-230 Schiller St. CHICAGO, ILL.

$5,000 *a Year from* Ten Acres

With Six Months Vacation

Independence and a Competence for Life

Five Thousand Dollars a Year

net income from ten acres of matured apple and cherry orchard in the *frostless* and *wormless* Bitter Root Valley with a *home and six months vacation* annually in one of the most magnificently endowed natural environments on the Creator's footstool, with *golf links, hunting, fishing and mountain climbing* and with neighbors of culture, education and refinement—is the opportunity we offer you.

We believe you will *investigate* this opportunity because this appeal for investigation is directed to broad-minded and sensible readers, living in an age of scientific progress which has made the impossible of yesterday the reality of *today.* This is *not* an offer of something for nothing. It *is* an opportunity for you to make an immensely profitable compact based on mankind's partnership with Nature. *We are now growing more than three thousand acres of fruit trees, one to three years old, for satisfied customers who would not consider selling their orchards at a large advance over their cost.*

$5,000 Yearly For Life From Ten Acres

A Bitter Root Valley apple orchard bears commercially in its fifth year. Ten acres, fully developed, should be capable of returning you during early maturity, strictly net, a profit of $2,000 to $5,000 yearly. Beginning with the 10th year from planting, judged by experience of others, 10 acres should net you *an income of $5,000 yearly and employ only half your time.*

If you have a fair-sized income now and are willing to improve your condition, *you do not need much capital* to possess one of these big-paying orchards.

Our Proposition and Plan

briefly stated is this: We will sell you a CHOICE 10-ACRE ORCHARD HOME TRACT (spring of 1913 planting) best standard varieties apples and cherries—*with the Company's definite written contract* to care for and develop your orchard under expert horticultural supervision for five full growing seasons from date of planting, including all land taxes and irrigation charges. You may, if desired, assume personal charge of your orchard at any time and secure a refund.

The land should easily become worth, conservatively stated, in fair comparison with other improved land, $1,000 an acre. There is a clean profit to you of 100 per cent on a 5-year investment to count on at the outset. Only a $300 cash payment required now to secure your orchard tract—balance in easy payments divided over a ten-year period. Your payments for the first few years are practically ALL the cash outlay you will have, as *your orchard tract should meet all payments falling due while in commercial bearing period and yield you a handsome profit besides.* Our reservation plan provides for *inspection of the land by you,* and **your money back** if dissatisfied.

INVESTIGATE by using this coupon TODAY

BITTER ROOT VALLEY IRRIGATION CO.
849-855 First National Bank Building, Chicago, U. S. A.

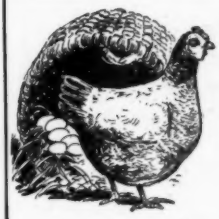
Robert S. Lemon, General Sales Manager.

Please send me full information concerning your Riverview Orchard Tracts in Bitter Root Valley.

Name _____

Street No. or Rural Route _____

Town _____ *State* _____



Laying Paying Poultry

Anybody who has a little spot of ground can raise poultry with *pleasure.* Anybody who knows how can raise poultry with *profit.*

The book that tells how is the "Poultry Guide-Post." Philip R. Park, one of the best known and most successful poultry raisers in America, wrote it and it tells all he knows about raising poultry for profit. It is a handsome, cloth-bound book with 132 big pages. Its regular price is $1.

You need the successful man's poultry trade paper too. It is called "Profitable Poultry." A splendid monthly magazine—full of practical experience written by men who know. Regular price $1.00 a year.

$2 for $1 and send no money

Write us that you want to see the book. When you have looked it over, send us $1.00 (if you want to keep it) and we will then send you, without further charge, the magazine "Profitable Poultry" for a year. Bought singly they would cost you $2.00—for the next 30 days $1.00 buys both—and you don't have to pay that until you have seen the book.

The Park & Pollard Company
70 Canal Street BOSTON, MASS.

HILDEBRANDT BAITS HOOK AND LAND 'EM

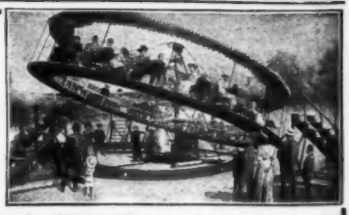
Experienced anglers choose them. Small outfit, interchangeable, catches any fresh water game fish. "Standard," "Slim Eli" and "Idaho," Gold, copper, brass, and nickel finish for bright or dull days. "They spin so easy!" Ball bearing—reversible. Don't catch in weeds. **Free New 1913 Catalog** Lists everything you need. Actual size illustrations. New flies, baits, spinners, rods, etc. Tells how to equip economically. Two cent stamp brings it.

The J. J. Hildebrandt Company, 1305 4th St., Logansport, Ind.

EARN $40 TO $80 A WEEK

selling Ann Arbor Lamps and Lighting Systems. Everybody wants this famous light. Show it, it sells itself. No experience necessary. Besides regular earnings we mail cash bonus checks every month to successful agents. Don't delay; write me at once. H. H. Seeley, Pres., Superior Mfg. Co., 294 Second St., Ann Arbor, Mich.

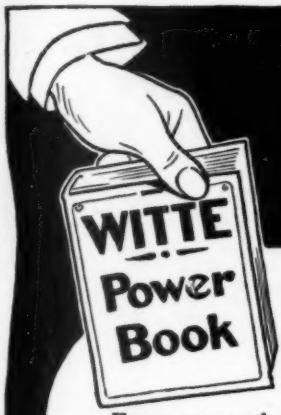
OVER $400 Made in One Day Operating the



CIRCLING WAVE, the catchy amusement device that combines the pleasure of the merry-go-round with the joy of boating on the gently rolling lake or bay. At Eagerton, Ind., Booher Bros. made $350.90 in six hours, and one day at Crawfordsville, $402, and another made $380 in six hours. **You can do this also** and employ only one assistant.

Write today for description of the CIRCLING WAVE and its wonderful money-making power.

ARMITAGE & GUINN, 159 Mill St., Springville, Erie Co., N. Y.



FREE!

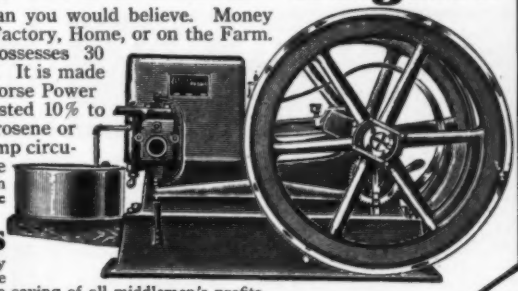
Absolutely FREE and Prepaid!

I Want to Send You This Marvelous Book Full of Money-Making Facts—New Ideas—and Valuable Information You Should Know

Every page of reading matter is filled with valuable hints and short cuts to SUCCESS. This great book explains in detail the tremendous, positively tremendous opportunity I now offer to readers of this magazine. It tells how to turn minutes into dollars—how you can do the work of five men with little effort—how to increase your present profits—how to add **new** and bigger profits to your income.

Big Money for YOU If You Own the Famous WITTE Engine

Yes, more real dollars and cents than you would believe. Money saved and money made in the Shop, Factory, Home, or on the Farm. The **FAMOUS WITTE ENGINE** possesses 30 distinct advantages over other Engines. It is made in 54 Styles and Sizes; from 1½ to 40 Horse Power produces power for every purpose; tested 10% to 20% overload; is run by Gasolene, Kerosene or Gas; Tank cooled, hopper cooled or pump circulation; built so that any part can be substituted by new improvements 100 years from now; cuts fuel bills in **HALF; COSTS BUT 1c PER HOUR PER H. P. TO RUN.**



At Factory Prices

By selling direct from my factory to users, my prices are way down below even the wholesale price. I give my customers the benefit of the saving of all middlemen's profits.

Guaranteed for Five Years

I give an **IRON CLAD GUARANTEE** with every one of my **WITTE ENGINES.** Back of this **GUARANTEE** is my big factory which has stood foremost in the Engine Field for **MORE THAN 43 YEARS. WITTE ENGINES** have stood the test of time. **WITTE ENGINES** bought 25 years ago are still making money for their owners—they pay for themselves over and over again. On this great offer my **PRICES ARE SO LOW AND TERMS SO REASONABLE** that I prefer to quote them only in **Direct Letters.**

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To Readers of Popular Mechanics!

Yes, I will ship any one of my **Famous Witte Engines** to you to use and test for 60 Days at **MY EXPENSE.** Prove for yourself that all I say is true. With my valuable book I will send full particulars of this Great Special Offer.

Offer Limited—Mail Coupon Immediately

Don't wait a minute. Put your name and address on the coupon or a post card and mail to me at once.

Send No Money. Everything sent to you free and prepaid. This offer may not appear again so send for free book and full particulars this very day—send **Immediately.**

WITTE IRON WORKS CO.
Dept. 1749
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Mail The FREE Coupon

TEAR HERE, SIGN AND MAIL

FREE BOOK COUPON

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Gentlemen: Without any obligation on me please send me, FREE AND PREPAID, your Big Money-making Book and details of your Special Offer on your **Famous Witte Engine.**

NAME.....

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A Lake Trip for Rest and Recreation

Arrange your vacation or business trip to include one of our palatial lake steamers. Every detail that counts for your convenience and comfort has been provided. The above view shows the "Palm Court with fountain of running water, on the latest steamer, City of Detroit III," operating between Detroit and Buffalo.

The Water Way

Daily Service between

Buffalo, Detroit, Cleveland & Mackinac

'The Floating Home Away From Home"

This wonderful liner is not surpassed by any fresh water steamer in the world, and contains unique features seen only in the finest metropolitan hotels; 600 staterooms, with phone and running water in every room. Perfect rest at night, and privacy by day.

Excellent dining service, cozy, inviting. Smoking rooms, writing rooms, drawing rooms, imported Orchestrions, perfect attendance with maids for the ladies. **All Modern Safety Devices Complete and Approved by U. S. Government.**

Your Railroad Tickets Are Good on D. & C. steamers between Detroit and Buffalo, Detroit and Cleveland, either direction. Information regarding rates and time tables upon request. Prompt connections with railroads for all principal cities. For illustrated booklet and map of Great Lakes, write, including 2-cent stamp, to

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PHILIP H. McMILLAN, Pres.
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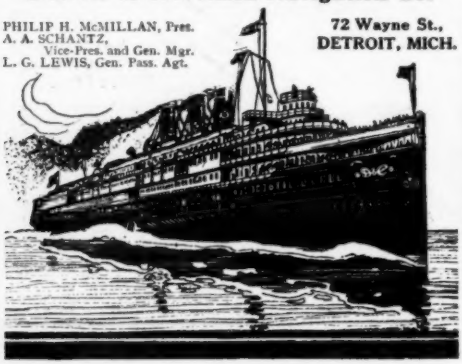
L. G. LEWIS, Gen. Pass. Agt.

72 Wayne St., DETROIT, MICH.



$1.00 Down

GETS THIS ***Guaranteed***

Weatherproof Waterproof OVERCOAT

For Motorists, Teamsters, Chauffeurs, Farmers, Railroad Men and **general use.** Made of toughest grade specially-prepared, highest-quality canvas—tan color—full ¾ length—absolutely waterproof—light—pliable—neatly finished—well tailored — stylish — carefully sewed. Seams, double lapped—heavy binding—large roomy pockets—horn buttons—worked button holes—better value than coats usually selling for $18 and up.

Wonderful Value

Price Complete $6.50—charges prepaid. Send us $1.00 as a guarantee of good faith and we will send you one of these coats—prepaid—subject to examination. If you find it as represented, pay the balance of $5.50 and the coat is yours. If not satisfactory, return it to us and we will refund your money.

When sending your order, give height, chest and waist measure and length of sleeve. **Order at once as our output is limited.**

HETTRICK BROS. CO.
1250 Fernwood Ave. Toledo, Ohio

NOTE—Special waterproof inner lining—detachable—for extra rough weather—$1 extra.

LEARN VENTRILOQUISM

and earn $30 to $200 a week. A **"WONDERFUL ART"** easy to learn. Red stamp for particulars. **Write today.**
PROF. CHAS. K. MaLOTTE, Indianapolis, Ind.

I Can Use 150 Men

At $30 a Week To

sell my unequalled line of household necessities at half ordinary retailers' prices. No experience required. This is your opportunity to get into a permanent, profitable business at an increasing yearly income. I have done exactly what I want you to do. My 17 years' experience and large six story factory building are back of you assuring you success. They also prove my proposition is right. If you want to **make big money quick** write me personally today, sure, for full particular

E. M. DAVIS, President
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You Can Be An Auto Expert

We teach you the entire subject by mail in 10 weeks' spare time, and assist you to secure good position. Demand for trained men can't be filled. Simple, practical and personal instruction. **Free auto model to each student.**

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Owners—we supply competent men

Empire Auto Institute, 232 Empire Bldg., Rochester, N. Y.

The Original Automobile School

The Perfect Food Tonic

All the nutritive elements of the best American Barley and the aromatic, nerve-quieting tonic properties of the choicest Saazar Hops are scientifically combined in

ANHEUSER-BUSCH'S

Malt-Nutrine

TRADE MARK

A predigested liquid food, acceptable to the weakest stomach; strengthening convalescents, weak or anaemic, building up the overworked and nerve-tired; invigorating old age.

Of greatest value to nursing mothers.

Malt-Nutrine contains 14½% of Malt Solids and 1 90/100% of Alcohol. Declared by U. S. Internal Revenue Department a Pure Malt Product and NOT an Alcoholic Beverage.

Sold by druggists and grocers.

A postal brings a beautifully illustrated *Malt-Nutrine* Booklet FREE—well worth reading.

ANHEUSER-BUSCH, ST. LOUIS, MO.

Flex-A-Tile Asphalt Shingles

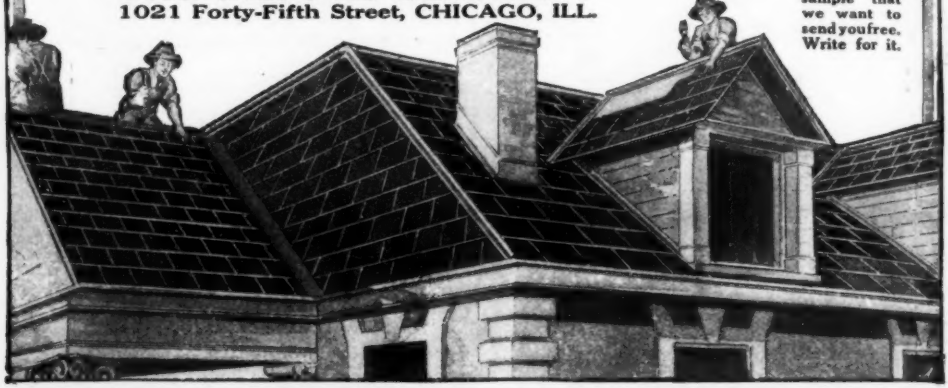
Combine beauty with permanency and low price

They are made of solid Asphalt surfaced with chipped slate or granite in natural colors of deep red and green.

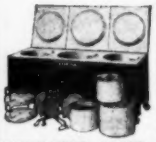
They make a wonderfully artistic roof—are easily and quickly put on and last as long as the house stands. They are the ideal modern roof.

THE HEPPES COMPANY
1021 Forty-Fifth Street, CHICAGO, ILL.

We have a sample that we want to send you free. Write for it.



30 Days Trial



"IDEAL" Fireless Cookstove

Works while you sleep or go about other duties. Special 1913 features put the **"Ideal"** in a class by itself. Cooks faster, better; keeps food hot longer. **Roasts, Bakes, Steams, Stews, Boils** perfectly. Lining and utensils **pure aluminum**—will not rust, corrode, crack or chip. Seamless cooking compartments. **Steam Valve,** only cooker with automatic condenser.

SAVES TIME, LABOR, FUEL, MONEY

Cooker Book FREE

Beautiful illustrated book describing the making of Fireless Cookstoves and their many varied uses, together with full details of our **30 day trial** offer and **easy payment** plan sent free on request. A postal will do.

THE TOLEDO COOKER CO., 1343 W. Bancroft St., Toledo, O.

WALKING STICKS PREVENT ROUND SHOULDERS—The assertion is made that if more men carried walking sticks there would be fewer round shoulders. The reason given is that the man who carries a stick swings his arms, which pulls the shoulders backward and pushes out the chest. The walking stick should be long enough to reach well up the hip, and should be carried alternately in either hand.

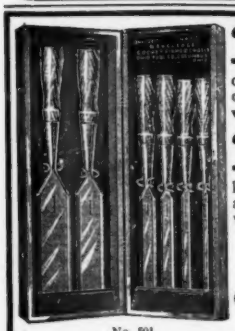
Monuments

You can now buy the most beautiful monuments, tombstones or markers at lowest quarry prices, direct by mail, under the strongest guarantee ever made by a monument firm. Choose from 200 exclusive designs and take—

A Year to Pay No collectors to annoy you. We sell direct from the quarry, save you all unnecessary profits and allow the lowest terms of payment. We do all lettering and satisfy you in every way.

FREE! Our latest Art Portfolio, done magnificently in purple and gold. Sent everywhere, FREE, just for the asking. Address:

Westminster Monument Co., 209 Westminster Bldg., Chicago



No. 501.

"OHIO" CHISELS are made from **high grade and specially selected tool steel,** and the care, skill and experience of our 89 years in the Edge Tool business is put into every tool bearing our "Ohio" Trade Mark shown here. The result is a **high grade and very satisfying tool, with a keen, tough and lasting cutting edge.**

REGISTERED

"OHIO" PLANES are fitted with our special extra Heavy Cutter, which prevents Chattering or Trembling when used in hard or knotty timber. **High grade cutters, accurate adjustments and true faces** are only a few of the points in which our planes excel and make it well worth your while to insist on having them from your dealer.

Write for our free Catalogue of High Grade Tools and Benches

OHIO TOOL CO. (Dept. 3)
COLUMBUS, OHIO

The Phonograph Offer you have been waiting for—Don't miss this opportunity

Music lovers delighted with SUPERB "Royal" Tone

Unsolicited Testimonials

Big list from all parts of the country sent to all who answer this ad.

ROYAL BEATS REST TO A STANDSTILL

It is a fine talking machine and many people who hear it play, say it beats all the rest to a standstill.
ROBERT CAMPBELL,
Portland, Me.

ROYAL GRANDEST AND FINEST MACHINE

I think my Royal Talking Machine is the grandest and finest talking machine I have ever heard.
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No. 123 Williams St.,
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ROYAL IS GRAND

Your machine is grand. Everyone speaks about what a fine machine it is, —so distinct. I cannot praise it enough.
J. M. SPELLACY,
No. 3 Metallic Ave.
Jamestown, N. Y.

COULD NOT DO WITHOUT ROYAL

I think my machine is the best in Oil City and many say it is the loudest and most clear toned they have ever heard. I could not do without it.
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Oil City, Penn.

WOULDN'T TRADE ROYAL FOR ANY OTHER

I like the Royal Talking Machine fine and think this is the best and the plainest machine I have ever heard.
JOHN WITTENBURG,
R.F.D. No. 1, Box No. 25,
Alexander, Ark.

EDISON OWNERS PREFER ROYAL

Those who have heard the Royal say it is the best that is made, even those that have the Edison. If they did not have Edisons they would get Royals.
THOS. J. BYERSON,
Eadenville, N. Y.

HAS OWNED ALL MAKES BUT LIKES ROYAL BEST

Received Royal all O. K. Best one I ever heard or saw. I have owned all makes but the Royal beats them all.
JOHN KNIGHTON,
Blue Springs, Miss.

ROYAL BEST MACHINE IN JASPER COUNTY

I have the best machine in Jasper County. I can play with the Edison or any of them and it beats them all. My machine is the talk of the town. Many thanks for it.
GEORGE W. GUESS,
West Liberty, Ill.

ROYAL DRAWS BIG CROWDS

I can say I am well pleased with my machine. My father is the postmaster and merchant here and the machine draws big crowds and everybody enjoys the music.
PENN STALLIONS,
Delwood, Ill.

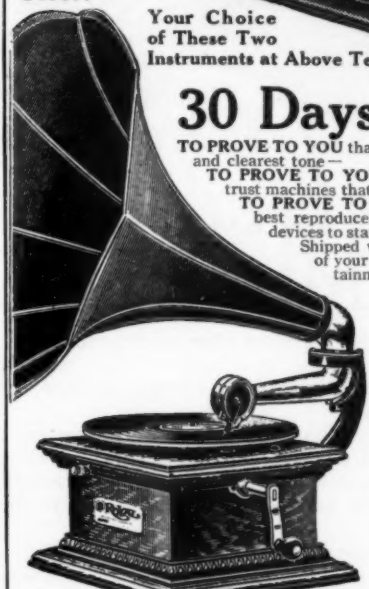
Total Cost Only - - - $7.50

By Our Great 7 Months' Time Purchase Plan

You actually save $17.50 by taking advantage of this Unparalleled Offer:

THE ROYAL
brings the living, breathing voices of the world's greatest singers into the home.

Your Choice of These Two Instruments at Above Terms



30 Days' FREE Trial

TO PROVE TO YOU that the Royal has the sweetest, purest, loudest, and clearest tone—
TO PROVE TO YOU that it is as large and handsome as the trust machines that sell at $25.00—
TO PROVE TO YOU that it has the strongest motor, the best reproducer and tone arm and the most ingenious devices to start, stop and control the music.
Shipped with a supply of 10-inch double-disc records of your selection so you can enjoy the finest entertainment for one whole month. Return the outfit

At Our Expense

if for any reason you do not wish to keep it after the Free Trial. Enjoy the finest entertainment for one whole month even if you are not thinking of buying a machine. Make home a pleasant place for yourself, family, and friends at least for one month. No embarrassing explanations to make if you decide to return the outfit after Free Trial. Whether you keep it or not we will be glad of the opportunity to prove to you and your friends what a wonderful entertainer the Royal is—how far superior to anything else you have ever heard—how good, wholesome music, as played on the Royal makes home and life more pleasant—how it strengthens home ties and the bonds of friendship.

Mail Coupon Today

or drop a postal for our large, handsome, illustrated circular, record book, big list of unsolicited testimonials and other literature—**ALL FREE**—no obligations whatever. Get posted on talking machine values whether you intend to take advantage of this offer or not. Our literature is worth having. The coupon or just your name and address on a postal brings it to you **FREE**. Better write **NOW**, before you forget.

Central Distributing House
Dept. A41, 61st and May Sts., Chicago

S. DAVIS, Mgr., Central Distributing House, Dept. A41, 6101-11 May St., Chicago ..... **Fold and tear off along this line**

Send me your beautiful, large circular, big list of testimonials, record book and other literature—ALL FREE. This places me under no obligation to order.

Name.....
P. O.....
State.....

All readers, who are or expect to be in the market for a high grade phonograph, should write for full particulars about this extra-liberal offer.

Ready for Anything

—at any time.

For *each* and *every* condition there's a *particular* feature of safety and service in

PENNSYLVANIA Oilproof VACUUM CUP TIRES

The suction hold of the vacuum cups, guaranteed to prevent skidding on wet or greasy pavements—

The absolutely oilproof quality, immune against deterioration from oily roads and garage floors—

The thick walled cups that drive deep and give unequaled traction in mud or sand—and thrust aside sharp stones and puncturing objects—

The extreme toughness and phenomenal heat radiating powers of the tread, offering the utmost resistance to the abrasion and friction of fast travel over fine roads—

And finally the definite printed guarantee of 4,000 miles attached to each casing—a distance far exceeded by the actual average service mileage.

In Stock Everywhere.

PENNSYLVANIA RUBBER COMPANY, Jeannette, Pa.

BRANCHES

Pittsburgh - 505 Liberty Ave.
Cleveland - 1837 Euclid Ave.
Detroit - 254 Jefferson Ave.
Chicago, 1004 Michigan Ave.
Minneapolis, 34 S. 8th Street
Kansas City - 514 E. 15th St.
Omaha - 215 S. 20th Street
Seattle - Armour Building

Pennsylvania Rubber Company of New York

New York, 1700 Broadway Boston, 149 Berkeley St. Dallas, 411 S. Ervay St.

Pennsylvania Rubber Company of California

San Francisco, 512-14 Mission Street Los Angeles, 930 S. Main Street

An Independent Company with an independent selling policy.

NON SKID
TRADE MARK REG. U.S. PAT. OFF.

ÆTNA-IZED?

A Wrecked Home

After a gas explosion in the middle of the night in which five persons were injured, this is the way one home looked. There are accidents of travel, accidents on the street and in the office—but ten per cent. of all accidents happen in or about the home. Not all of them are so serious as this one, but all of them cause bodily injuries and everybody needs the protection afforded by accident insurance in the **ÆTNA LIFE.**

The accident policies of the **ÆTNA LIFE INSURANCE COMPANY** of Hartford, Conn., cover liberally all kinds of accidents.

In 22 years it has paid out over ten millions in accident claims, and in 14 years, over one million in health claims. Its 110 millions of assets and its great reputation for prompt and liberal settlements gives the **ÆTNA** the leading place in the accident insurance business, and it is the largest Company in the world writing Life, Accident, Health and Liability Insurance.

Send for information about its policies.

SEND IN THE COUPON TO-DAY

ÆTNA LIFE INSURANCE CO., (Drawer 1341) Hartford, Conn. Pop. Mech. Tear off

I am under 60 years of age and in good health. Send me information about Accident and Health Insurance. My Name, business address and occupation are written below.

Jackson "Olympic"—$1500

Four cylinders, 35 horsepower; unit power plant; long stroke motor 4⅛x4¾ inches; 115-inch wheel-base; 34x4 inch tires. Complete equipment, including Disco starter. Black and nickel trimmings. Electric starter and lights, optional, $225 extra.

"Majestic"—4 cylinders, $1975. "Sultanic"—6 cylinders—five passenger, $2500—seven passenger, $2650

Buyers are judging car comfort by what they find in the Jackson

So much has been said and printed recently about Jackson comfort that thousands of automobile buyers are making it the basis of their comparisons.

This is the position in which you will find yourself when you inspect the Jackson and the various other cars.

You will not be able to ignore the Jackson nor to put it out of your mind as you examine other cars; nor to avoid comparing these others with it.

It is true that you will see many comfortable cars, because this year manufacturers are exerting unusual energy in this direction.

But you will find also that the Jackson dominates the entire field.

If you seek the reason for this you will discover that other manufacturers are beginning to do only now what we have been doing for years — providing for the passengers' ease.

Experience is always valuable; and the experience of eleven years has taught our engineers how to harmonize the details of motor car construction and produce maximum comfort.

Long ago experiment demonstrated that the full elliptic spring has 33 to 100 per cent more action and resiliency than any other type; so all Jacksons are fitted with four full elliptic springs.

Jackson wheelbases are long; and they contribute to the riding ease because their ratio to wheel sizes, springs, car weight and load to be carried, is carefully worked

With 10-inch seat cushions, slanted a bit toward the rear; we build the backs to shoulder height and upholster them richly, too.

We have provided a motor of the long stroke, enclosed-valve type that is silent, sure and powerful.

And back of it a train of transmission and driving mechanism, fitted with ball and roller bearings throughout, developed to the high point reached in the motor.

All the Jacksons are equipped with self-starting devices — two of them electric and an electric starter optional on the third — which add the last touch to the convenience of their operation.

See the Jackson; have a demonstration of its remarkable comfort; and we are willing to leave the decision to your judgment.

Jackson Automobile Company, 1301 E. Main St., Jackson, Mich.

You Want to Pass the Crowd?

The winners in the world's race are those who have learned to conserve their energy, to make every motion count, to walk straight and think straight. You must travel with ease as well as with speed, if you expect to get there. That's why O'Sullivan's Heels of New Live Rubber are an invaluable aid to efficiency. They protect the body from the impact of walking; they conserve nervous energy; they make the step light and easy; and they lessen fatigue.

Nature gave us heels to walk on—and Nature's heels are simply soft cushions of flesh to take up the shock of the body's weight when the foot is thrown forward.

Civilized man has defeated Nature's purpose with his hard shoe-heels of iron nails and armor-plate leather. Every step you take on hard leather heels is like the blow of a hammer.

O'Sullivan's HEELS of New Live Rubber

In wearing O'Sullivan's Heels you are merely going back to Nature. These soft cushions of springy rubber, placed under your heels, take up the jar and shock of walking. They make every pavement feel like a well-kept lawn.

Successful people wear O'Sullivan's Heels, for they have learned that these wonderful aids to walking lessen fatigue, and make more efficient the men and women who wear them.

O'Sullivan's Heels are invisible when attached, as they have the shape and color of leather heels.

Their cost is fifty cents, which includes the labor of putting them on. Any shoemaker has them, and it takes about fifteen minutes to change from hard leather to elastic rubber.

Suppose you give them a trial, and

O'Sullivanize Your Walk

AutoStrop Safety Razor Co.

345 Fifth Avenue

TORONTO New York LONDON

NOTICE!

In the fall of 1912 we announced the policy of Guaranteeing 500 Shaves from each package of 12 Blades.

This guarantee is entirely reasonable, because the self-contained stropping feature in the AutoStrop Safety Razor makes stropping so simple and efficient that a shaver cannot resist the temptation to use it. The stropping assures long life to the blade in addition to smooth, cool shaving.

Past experience has shown that the 500 shave Guarantee is conservative.

We take this opportunity of again calling the nature of this Guarantee to the attention of the public:-- "Should anyone fail to get at least 500 Shaves from each package of 12 Blades he will, upon mailing them to us, receive in return enough new blades to make good his shortage.

AUTOSTROP SAFETY RAZOR CO.

H. J. Gaisman

PRESIDENT.

Wonderful Increase in 1912

In Strength, Stability, Safety and Public Usefulness

Assets, over		291 Million Dollars
Liabilities	Including Policy Reserve, 228 Million Dollars; and amount set aside for Holders of Deferred Dividend Policies, 31½ Million Dollars; of which there is payable in 1913, over 4 Million Dollars	nearly 267 Million Dollars
Capital and Surplus, over		24 Million Dollars
Paid Policyholders in 1912, over		31 Million Dollars

Total Paid Policyholders Since Organization, Plus amount held at interest to their credit, over
FIVE HUNDRED AND TWENTY-FIVE MILLION DOLLARS

Life Insurance Issued and Paid for in 1912, over	480 Million Dollars
Increase in Insurance in Force, over	192 Million Dollars

More than 11 Million Policies in Force Insuring over
2 BILLION, 211 MILLION DOLLARS

Over $73,000,000 invested in Real Estate Bonds and Mortgages.

Amount of Voluntary Concessions paid to Policyholders to date, nearly 17½ Million Dollars.

Premiums were Reduced in 1912 on New Ordinary Policies, and on new $500. and $750. Intermediate Policies.

126,000 Death Claims and Endowments paid in 1912.

Lowest Expense Rate in the Company's History.

The Prudential

Insurance Company of America

INCORPORATED AS A STOCK COMPANY BY THE STATE OF NEW JERSEY

FORREST F. DRYDEN, President **Home Office: NEWARK, N. J.**

Suggested: *(Whether you are insured or not) write for particulars of Prudential Monthly Income Policy, which guarantees an income for 20 years or life. Write today. Dept. 137.*

DRAW BIG MONEY!

Yes: $125 to $175 Per Month to Start

I know you would like to draw such a salary and more, and you positively will earn this amount easy when you are a thorough

Practical Trained Draftsman and Designer

The constant demand for my trained men always exceeds the supply. Many positions paying $75 to $100 per week remain open on account of the shortage of the proper men to fill them. Some weeks over 250 positions paying the highest salary in all parts of the country are open and I would like to prove this to you by sending you one of my regular weekly lists of open positions.

Chief Draftsman Will Train You Personally and Instruct You Properly

On practical Drafting room work UNTIL you are absolutely competent in every respect as a first class Draftsman and UNTIL you are placed in a permanent paying position at a salary paying at least $125 per month. This is a most exceptional opportunity for just a limited few selected ambitious men, between the ages of 16 and 40, whom I will train personally and give individual Instruction as required in order to fill the constant demand for properly trained men in this line.

Absolutely FREE! this Complete $15 Draftsman's Working Outfit

IF You Write to Me AT ONCE

By sending the FREE COUPON on bottom of this page for my most liberal FREE OFFER for the $15.00 Draftsman's Working Outfit, and also for my special offer to

Earn Big Money at Once While Learning at Home

Yes, my friend, you can make big money at once right at home from the very start—as much as **$5 to $10 per day.** I will pay you while learning.

I give **EACH** of my students my own PERSONAL ATTENTION—therefore, I limit the number of my students and if you desire such an opportunity then get busy NOW and WRITE TO ME AT ONCE. Don't wait until tomorrow, but do it TO-DAY. You can earn much more than I charge for my spare time and personal training. This is not a money making correspondence school. We NEED good men to fill good paying positions and my practical working training is the result of the most urgent need for Draftsmen.

With my twenty-two years' experience as Chief Draftsman in handling men, I know exactly how urgent good men are needed all the time, and I will give you the benefit of my twenty-two years' experience at this work and will make you as high grade a man as you desire to be. You can draw $125 to $175 per month and steadily keep on going higher, as many good men draw $5,000 per year in this line. You can do the same if you will grasp this opportunity.

Remember: You can be earning good money while you are learning at home to do the practical Drafting room work.

Mail FREE COUPON at once for my book "Successful Draftsmanship," also list of open positions and for the free offer to be earning good money at once while you are learning at home. This offer is positively limited and in order to benefit thereby you must act AT ONCE—not tomorrow but TO-DAY.

I Guarantee

To instruct you UNTIL competent and placed in a permanent paying position at a regular Draftsman's salary of at least $125 to $175 per month and **guarantee** to furnish you free the complete Draftsman's working Outfit at once from the start.

FREE BOOK and EARNING while LEARNING Offer Coupon

Chief Draftsman,
Division 1195,
Engineer's Equipment Co.,
Chicago, Ill.

Without any obligation on me whatsoever, please mail your book "Successful Draftsmanship" and full particulars of your liberal "Personal Instruction" offer to a few students. It is understood that I am obligated in no way whatever.

NAME.....

ADDRESS.....

Address: Chief Draftsman
Engineer's Equipment Co. (Inc.)
Division 1195 CHICAGO, ILL.

Makes work easy—saves money

Artificial diamond wheels at 3000 revolutions per minute on Luther Shop Tool Grinders do the toughest job of grinding in a few minutes, and make it so easy to keep tools keen that tools are always in perfect edge. Keen tools make work go faster and amazingly easier. 17 extra attachments give you low cost workshop equipment, including jig and rip saws, forge, lathe, drill, etc.

LUTHER
Shop Tool Grinder

DIMO-GRIT, the artificial diamond sharpening substance especially adapted for steel, is found only on Luther Grinders. DIMO-GRIT cuts hardest steel as emery cuts soft copper. Cuts steel 25 times faster than grindstone, 10 times more efficient than emery. **No danger of drawing temper**—no need of cooling with water. DIMO-GRIT wheels many times outwear emery wheels and grindstones, will not glaze or get lopsided.

30 Days Free Trial

No money needed, no promises to make, or papers to sign. Use a Luther shop outfit 30 days absolutely free. Sharpen all your tools — test it every way—keep track of the time it saves you. Watch how all your work speeds up because your tools are keen.

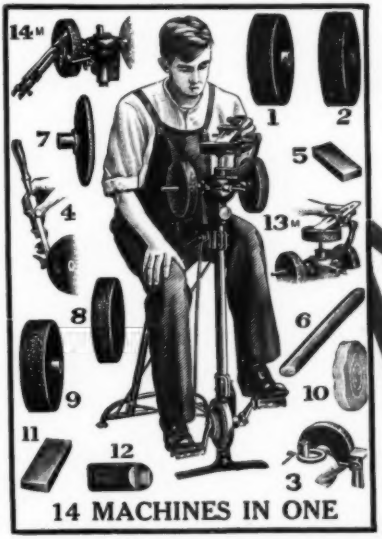
Send back the coupon today for 40-page free book and pick out a Luther outfit — then write and get the outfit for 30 days free trial—no money needed, no obligations whatever except to send it back at my expense if you do not care to keep it. Free book also gives valuable points on tool sharpening and tells the story of artificial diamond sharpening substances—return coupon today.

Saves its price over and over

In the way it saves time, saves tools, saves trouble, makes work easier, and outwears emery wheels and grindstones, the Luther Shop Tool Grinder pays for itself over and over. It is positively profitable for every shop and tool user, all of which you can prove free.

This tool grinder is as durably built as a high grade lathe — rigid, all metal construction, enclosed shaft drive, dust-proof bearings — nothing to wear out. Runs easy as sewing machine — foot and engine power. Tool rests and attachments give proper bevel, plane bits, chisel, twist drills, etc.

Over half a million Luther Grinders are now in use — Try a Luther Shop Grinder free for 30 days. You will find it is a wonderful saver of work, time and money. Send back the coupon today.



14 MACHINES IN ONE

Ask your dealer for DIMO-GRIT Sharpening Stones, the best for steel, leaves smoothest edge. Look for the name DIMO-GRIT on the stone

Return this Coupon

Return this coupon today. You can't afford not to find out about this great labor-saving machine. Tear out the coupon now.

Luther Grinder Mfg. Co.
1909 Michigan St., Milwaukee, Wis.

Luther Grinder Mfg. Co., 1909 Michigan St., Milwaukee, Wis.

Please send me 40 page free book illustrating and describing Luther Tool Grinder Outfits — from which I can select an outfit for 30 days free trial should I decide to do so. This does not put me under any obligations.

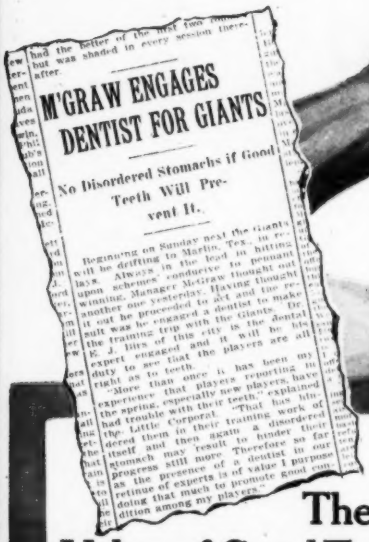
NAME .....

ADDRESS .....

W. F. HALL PRINTING COMPANY, CHICAGO

COLGATE'S
RIBBON DENTAL CREAM

TRADE MARK



had the better of the last two games but was shaded in every session thereafter.

M'GRAW ENGAGES DENTIST FOR GIANTS

No Disordered Stomachs if Good Teeth Will Prevent It.

Beginning on Sunday next the Giants will be drifting to Marlin, Tex., in readiness. Always in the lead in hitting upon schemes conducive to pennant winning, Manager McGraw thought out another one yesterday. Having thought it out he proceeded to act and the result was he engaged a dentist to make the training trip with the Giants. Dr. E. J. Hirs of this city is the dental expert engaged and it will be his duty to see that the players are all right as to teeth.

"More than once is has been my experience that players reporting in the spring, especially new players, have had trouble with their teeth," explained the Little Corporal. "That has hindered them in their training work of itself and then again a disordered stomach may result to hinder their progress still more. Therefore so far as the presence of a dentist in our retinue of experts is of value I purpose doing that much to promote good condition among my players."

Drawing reproduced by the courtesy of Baseball Magazine

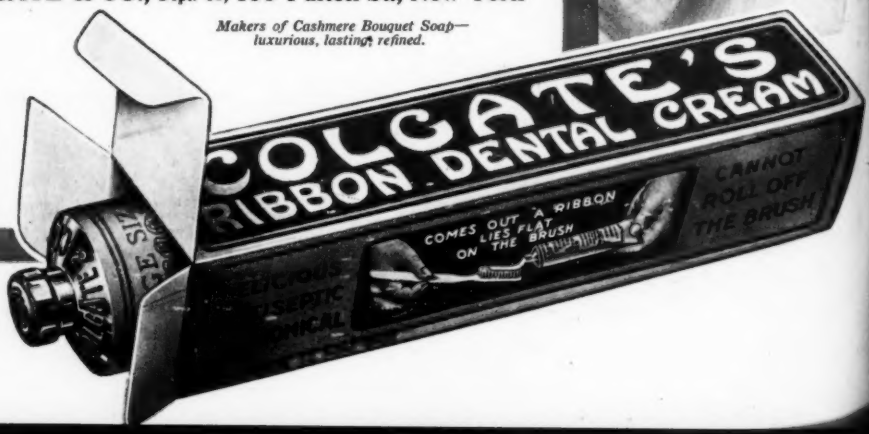
The Giants Know the Value of Good Teeth—Good Health

There is a message for every one in the news item shown here—the message that proper care of the teeth is necessary for work or play, for sport or study. Good health is essential—for good health you must have good teeth to chew your food and give you good digestion.

Join the Good Teeth Good Health Squad—begin to use Colgate's Ribbon Dental Cream. It cleans the teeth thoroughly without scratching—it is antiseptic and checks decay-germs—it has a delicious flavor which makes its use a treat.

Most people realize the value of their teeth only when they begin to lose them. Start to save yours today.

Your dealer has Colgate's—or we will send a generous trial tube on receipt of 4c in stamps.

COLGATE & CO., Dept. 81, 199 Fulton St., New York

Makers of Cashmere Bouquet Soap—luxurious, lasting, refined.